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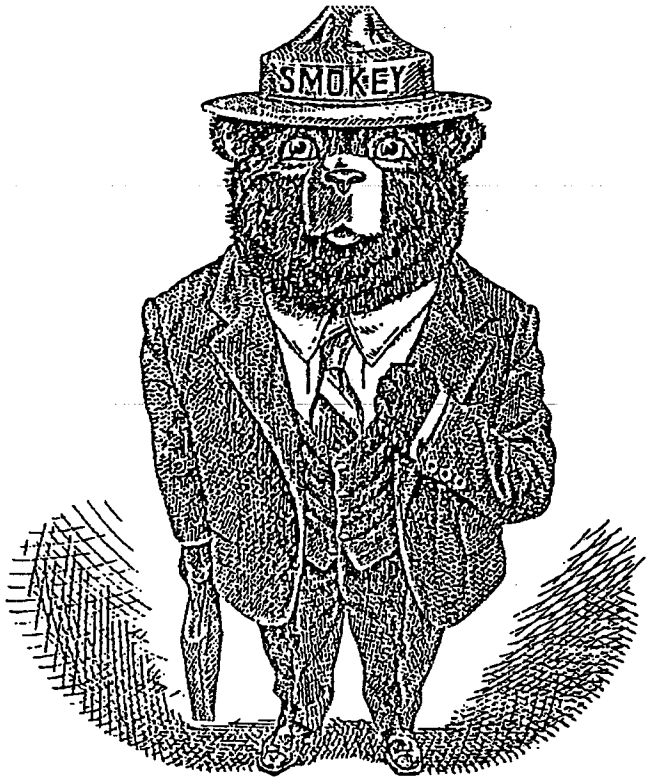

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COMMENTS:

more coming as becomes available

also includes narrow fjords and channels that occur in the spill area. The coastal ecosystem has two distinct zones: the subtidal and the intertidal.

The Subtidal Zone

The nearshore, shallow subtidal zone provides the transition area between the marine, deep-water environment and the intertidal zone. The subtidal zone extends from the low tide boundary of the intertidal zone into the open-water area. Because the nearshore subtidal community is similar in many respects to the intertidal community, it is considered separately from the marine ecosystem. Monitoring and research are the most likely restoration actions to focus on the subtidal communities. Because monitoring and research are not likely to produce environmental impacts (see the discussion on Monitoring and Research in Chapter 1, pg 19) organisms in the subtidal community are not analyzed in this DEIS. However, clams occur in both intertidal and subtidal zones and may be affected by some of the proposed actions. Therefore, the impacts on clams will be analyzed along with other intertidal organisms. *

Monitoring could have effects, some of which may be significant, when research is involved. This is a particular weakness in the analysis when your monitoring and research plan is not included in the EIS for review

The Intertidal Zone

The intertidal zone is the environment located between the extent of high and low tides. Because of the rise and fall of the tides, the area is not always covered with water. The size of the intertidal area is determined by the slope of the shore and the extent of the rise and fall of the tides (Newell, 1979). Inhabitants of the intertidal zone consist of algae (e.g., *Fucus*), mussels, clams, barnacles, limpets, amphipods, isopods, marine worms, and certain species of fish. The intertidal zone is used as a spawning or rearing area for many species of fish (EVOS Trustee Council, 1992) and serves as a feeding ground for marine consumers (e.g., sea otters, Dungeness crabs, juvenile shrimps, rockfish, cod, and juvenile fishes), terrestrial consumers (e.g., bears, river otters, and humans), and birds (e.g., black oystercatchers, harlequin ducks, numerous other species of ducks, and shorebirds) (Peterson, 1993). Because of the nature of the intertidal environment, the intertidal zone is especially vulnerable to initial and continued contamination in the event of an oil spill, as well as to the effects of cleanup operations (EVOS Trustee Council, 1992).

The oil spill caused population declines and sublethal injuries to the community of plants and animals living in the intertidal zone. Portions of 1,500 miles of coastline were oiled (350 miles heavily oiled), resulting in significant impacts to intertidal habitats, particularly in the upper intertidal zone. With tidal action, the oil penetrated deeply into cobble and boulder beaches that are relatively common on the rocky islands of the spill area. Cleaning removed much of the oil from the intertidal zone, but subsurface oil persisted in many heavily oiled beaches and in mussel beds (mussel beds which were avoided during the cleanup).

Direct oiling killed many organisms, but beach cleaning, particularly high-pressure, hot-water washing, had a devastating effect on intertidal life. Several studies have documented the combined effects of oiling and cleanup on beaches and now track the course of recovery. Because of little or no prespill data, these studies have relied on comparisons of oiled and nonoiled sites. Because of our ability to measure effects on common organisms, these comparisons have been emphasized in the injury studies.

Affected Environment 3

Historical properties located in the uplands adjacent to treated shorelines were at risk when people visited those uplands. Although a blanket restriction on upland access by cleanup crews was in effect throughout the shoreline-treatment phase, some degree of access was required to efficiently undertake treatment activities. Shoreline-treatment techniques included manual removal, bioremediation, and mechanical treatment (Haggarty et al., 1991).

A variety of pedestrian upland crossings during the cleanup process resulted in damage to cultural resources, especially surface features. Vandalism and looting of cultural sites occurred as a result of uncontrolled or unsupervised access to the immediate uplands, particularly where rock shelters, historic cabins, mine sites, and other surface features or subsurface deposits were exposed. Most of the areas affected by the EVOS had not been adequately surveyed for cultural resources before the spill. Increased activity in these areas resulted in more people knowing the whereabouts of many more historic properties. This in turn resulted in looting and vandalism (Mobley et al., 1990).

Vandalism resulted from the activities of people interested in artifacts but unaware of the damage caused by uncontrolled collecting. Vandalism results in an irretrievable loss of information from sites, and damage to sites often invites further damage. Sites cannot be repaired (Corbett and Reger, 1993). This increase in knowledge of site presence and location continued after the EVOS cleanup, resulting in higher rates of potential and documented vandalism. "At many archeological sites, the damage is actually an increased threat of disruption due to wider public knowledge of the sites" (ADEC, 1993:180). Without additional education and interpretation to increase public awareness of the effect of vandalism on historic properties, and without the additional presence of stewards, monitors, or law enforcement personnel, the trend of site damage appears likely to continue in the future.

Subsistence

Alaska is the only state in which a significant proportion of the population lives off the land or practices a subsistence lifestyle (Campbell, 1991). Subsistence is critical to supporting the incomes and cultural values of many Alaska residents. However, the relatively small, predominantly Native communities had a larger percentage of residents greatly affected than did larger, predominantly non-Native communities (Palinkas et al., 1993).

Subsistence Definitions

While there are a variety of cultural, popular, and sociological definitions and interpretations of subsistence, Congress defined subsistence in Section 803 of the ANILCA as:

> ...the customary and traditional uses by rural Alaska residents of wild renewable resources for direct personal or family consumption as food, shelter, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade.

Court rulings on the State's interpretation of ANILCA requirements have resulted in radical changes in State and Federal roles and responsibilities regarding subsistence management in Alaska. The State of Alaska operated a program that met Federal requirements until the

Although a number of fisheries were closed immediately following the spill and reopened once it had been determined that local fish were safe to eat, some Alaska Natives are unwilling to eat them for fear of contamination. Spot shrimp fisheries were closed in 1989 and 1990. Clams, an important part of the Native diet, were shown to be contaminated after the spill. Fish, bear, moose, deer, and other Native meats were deemed safe to eat by Federal and State health officials; but not all Prince William Sound subsistence users were willing to go back to harvesting them.

While subsistence users were being told that the fish were safe to eat, Federal Agencies banned the commercial sale of fish that showed any level of hydrocarbon contamination. The confidence that subsistence users had in the information they were given by health officials was shaken by this inconsistency (ICF, 1993).

Perception of users is not a Restoration consideration - cannot restore perception only resources themselves ←

~~Throughout the restoration process, it is important to consider the effects of perceptions of contamination as well as actual contamination, because it is the perceptions that affect the decision on whether or not to harvest subsistence resources in the EVOS area.~~

Recreation and Tourism

Recreation use in the EVOS area is diverse, with a variety of opportunities available for both commercial (tourism) and noncommercial users. Commercial recreation includes uses by clients and operators of tourism services such as boat tours, fishing charters, and flightseeing services. Noncommercial recreational users engage in many of the same activities as commercial users but do not purchase or pay for the services of tourism businesses. Common recreational activities for all users include kayaking, camping, hiking, boating, sightseeing, photography, scuba diving, beachcombing, flying, sport fishing, hunting, gathering food, and investigating the history of an area. Recreation use occurs year round, but the majority of use from in-state and out-of-state residents occurs during the summer months from May through November (PWSRWG Draft 1994). Because of the remoteness of many of the recreational opportunities in the EVOS area, there is a blending of commercial and noncommercial recreation. That is, noncommercial recreation often entails commercially obtained services, especially transportation. For instance, to kayak in Prince William Sound, many recreationists will take the train to Whittier and charter a boat to access the more remote areas of the Sound. Sport hunters will often use charter aircraft to land them in a remote area to hunt.

Many recreational activities are nonconsumptive. Kayaking, photography, motorboating, flightseeing, and these types of nonconsumptive activities do not remove parts of the environment as an integral part of their practice. Recreational hunting, fishing, and plant gathering are, in contrast, consumptive. Animals and plants are taken from within the area for consumption. These may be consumed while recreationists are in the area or be removed from the area to be consumed in (often) urban areas. Recreational hunting will not be addressed in this document because no restoration plans are likely to be submitted which would affect populations of animals hunted for sport.

3 Affected Environment

Hatcheries

Article VIII, Section 5, of the Alaska Constitution authorizes the State legislature to "provide for facilities improvements and services to assure further utilization and development of the fisheries". In 1974, the Private Nonprofit Hatcheries Act (Chapter III, SLA 1974) was enacted which "authorized private ownership of salmon hatcheries by qualified nonprofit corporations for the purpose of contributing by artificial means to the rehabilitation of the state's depleted and depressed salmon fishery." Since that time, the ADF&G, Division of Fisheries Rehabilitation, Enhancement and Development (FRED Division) and PNP groups have cooperated to build hatcheries throughout the State, including Prince William Sound, Cook Inlet, and Kodiak (Table 3-4). Although several were built and operated by the FRED Division, all presently are being operated by the PNP organizations to produce fish for the common property fisheries, primarily for the benefit of commercial fishermen.

The importance of hatchery-reared salmon was made apparent during the 1986 season, when approximately 11.5 million pink salmon were caught in Prince William Sound. Approximately 10.5 million fish were harvested in common property fisheries, and 909,219 fish were harvested in the special harvest areas of two major PNP hatcheries to provide operating revenue. Approximately 5.8 million fish in the common property harvest were of hatchery origin. The combined common property and sales harvests of hatchery-produced fish was 6.8 million fish. This marked the first time in the history of the fishery that hatchery fish constituted more than half of the pink salmon harvest in Prince William Sound (Sharr et al., 1988). During the 1993 commercial-fishing season, approximately 12 million pink salmon were harvested at Kitoi Bay Hatchery, near Kodiak. This was more than half of the Kodiak area pink salmon harvest and approximately 49 percent of the hatchery-produced pink salmon of the entire state (FRED Division Annual Report, 1994).

The Prince William Sound hatcheries provide up to 40 percent of the salmon harvest in the Sound. In 1988, because of low natural runs of pink salmon, it is estimated that they contributed almost 90 percent of the Sound's total pink salmon harvest (ADF&G, 1989). Hatchery production in Prince William Sound contributed 83 percent of the pink salmon catch (18 million fish) in 1989, 70 percent (32 million fish) in 1990, and 84 percent (31 million fish) in 1991. Nevertheless, there is evidence that the EVOS had reduced the survival of pink salmon fry that were released from the hatcheries in 1989 (Peckham et al., 1993). During 1993, the preliminary estimated adult returns to the salmon hatcheries in the EVOS area exceeded 21 million fish. The greatest beneficiaries of these fish were the commercial fishers, although some of these fish were caught by sport, subsistence, and personal-use fishermen (ADF&G, 1994).

A shift in the composition of salmon in the harvest by the common-property fishery can be attributed to the hatchery system. Because recent wild-stock returns have been small relative to hatchery returns, it has been necessary to close the mixed-stock areas of the general districts and harvest a majority of the surplus hatchery returns in the hatchery-terminal-harvest areas to achieve minimum escapement goals for wild stocks, (PWSAC, 1990).

The EVOS disrupted the usual pattern of commercial salmon fisheries in 1989 in Prince William Sound; and, although the catch was above the previous 10-year average, an exceptionally large portion of this catch was pink salmon from the special-harvest areas at the PNP hatcheries. Consequently, the common-property commercial-fishery harvests fell below the 10-year average (Brady et al., 1991).

Table 3-3
Salmon Hatcheries Located within the *Exxon Valdez* Oil Spill Area.

Management Area	Hatchery	Operator	Approximate Location	Primary Fish Species
PWS*	Solomon Gulch	Valdez Fisheries Development Association	Valdez	pink, chum, coho
PWS	Cannery Creek	PWS Aquaculture Corporation	north PWS	pink, chum
PWS	Armin F. Koerning	PWS Aquaculture Corporation	south PWS	pink, chum
PWS	Wally H. Noerenberg	PWS Aquaculture Corporation	northwest PWS	pink, chum, coho, chinook
PWS	Main Bay	PWS Aquaculture Corporation	west PWS	sockeye
PWS	Gulkana I, II	PWS Aquaculture Corporation	upper Copper River	sockeye
Lower Cook Inlet	Tutka Bay Lagoon	Cook Inlet Aquaculture Association	lower Cook Inlet	pink, chum
Upper Cook Inlet	Crooked Creek	Cook Inlet Aquaculture Association	central Cook Inlet	sockeye
Upper Cook Inlet	Trail Lakes	Cook Inlet Aquaculture Association	upper Cook Inlet	sockeye, coho
Kodiak	Kitoi Bay	Kodiak Regional Aquaculture Association	Afognak Island	pink, chum, coho, sockeye
Kodiak	Pillar Creek	Kodiak Regional Aquaculture Association	Kodiak	sockeye

*Prince William Sound

Source:

In addition to fish hatchery production and fisheries management, ADF&G has worked with the U.S. Forest Service (USFS) and the PNP groups to implement management measures or in-stream projects to rehabilitate, if necessary, and increase salmon populations in the Prince William Sound area. Past efforts have included restoring wild stocks to former levels of abundance through stream improvements, fish ladders, and other activities that improve natural habitat conditions. Stream-rehabilitation projects have been carried out by the USFS in cooperation with the ADF&G, because many of the spawning streams are located in the

This should NOT be included in Hatchery Section — Restoration funds can only be used to restore Natural/wild stocks — this implies that funds can be used for restoration activities associated w/ hatchery stocks or hatchery activities

Between 1984 and 1988, the number of anglers and fishing days, and the total fish harvest in the oil-affected area had been increasing at a rate of 10 to 16 percent per year. Since 1977, there has been a 4.5 percent average- annual increase in the number of residents who sport fish, while the number of nonresidents sport fishing has increased 16 percent annually. However, after the oil spill, between 1989 and 1990, a decline in sport fishing (number of anglers, fishing trips, and fishing days) was recorded for Prince William Sound, Cook Inlet, and the Kenai Peninsula. The decline occurred because of closures, fear of contamination, the unavailability of boats, and congestion at some sites outside the spill area (Carson and Hanemann, 1992). In 1992, an emergency order restricting cutthroat trout fishing was issued for western Prince William Sound because of low adult returns. The closure ~~is expected to continue at least~~ through 1993.

Because commercial fishing for sockeye salmon in Cook Inlet was curtailed in 1989 to avoid fouling fishing gear and processing tainted commercially caught fish, the number of sockeye salmon that spawned in the Kenai River was approximately three times the desired amount. Although sport fishers enjoyed this bounty in 1989, this spawning resulted in an overpopulation of sockeye salmon fry and a dramatic reduction in smolt production. Consequently, very weak returns are forecasted for 1994, 1995, and possibly later years as well. These weak returns are likely to lead to some sport fishing closures as well as commercial fishing closures (Koenings, Schmidt, Fried, Tarbox, and Brannian, 1993; Schmidt, Tarbox, Kyle, King, Brannian, and Koenings, 1993).

In 1986, the estimated expenditures by sport fishers in southcentral Alaska were $127.1 million. These expenditures directly supported over 2,000 jobs in sport fishing-related businesses, and the equivalent of 2,840 full-time jobs were supported in all industries in Alaska by sport fishing activity in southcentral Alaska (Jones and Stokes, 1987). Carson and Hanemann (1992) calculated that there were 127,527 and 40,669 sport fishing trips lost during 1989 and 1990, respectively, in southcentral Alaska because of the EVOS. They also calculated that the lost economic value of these trips was $31 million and ranged from $3.6 million to $50.5 million.

Economy

The economy for the EVOS area and Anchorage for 1990 is described in summary in Table 3-3. Anchorage is added to the EVOS area because there are so many strong linkages from the economy of the EVOS area to Anchorage which is the closest large economic center to the EVOS area. This table has 12 economic sectors and six measures of economic performance. It is in the format of IMPLAN (IMpact PLANing) which is an economic model used for economic analysis.

IMPLAN's output classification system is based on systems defined by the Bureau of Economic Analysis, U.S. Department of Commerce, and the Standard Industrial Classification (SIC) used by the federal Office of Management and Budget. The analysis is conducted using 528 industries and the results are aggregated into 12 sectors. The 12 sectors are as follows:

1. Forestry - Forestry firms operating timber tracts, tree farms, forest nurseries or perform forestry services.

4 Environmental Consequences

Monitoring and research, as actions, generally do not impact resources and services and therefore are analyzed only for their economic impacts. It is recognized that the general restoration category also includes such actions as data gathering, surveys, and analysis that would not impact the resources--thus these activities would not be included in the EIS analysis except for the impacts on the economy.

"Recovery"

The definition of the term recovery has a significant bearing on the discussion of the various alternatives described in this chapter. The settlement funds may be used for the purpose of, ". . . restoring, replacing, enhancing, rehabilitating or acquiring the equivalent of natural resources injured as a result of the *Exxon Valdez* oil spill and the reduced or lost services provided by such resources." The goal of restoration is recovery of all injured resources and services. For some resources, little is known about their injury and recovery, so it is difficult to define recovery or develop restoration strategies.

In the analysis of impacts to the various resources in the EIS, it may be that an action will accelerate the rate of recovery and not measurably impact the number of individuals in the population for several years. This is still viewed as having a significant beneficial impact on the resource analyzed.

In general, resources and services will have recovered when they return to conditions that would have existed had the spill not occurred. Because it is difficult to predict conditions that would have existed in the absence of the spill, recovery is often defined as a return to prespill conditions. For resources that were in decline before the spill, such as marbled murrelets, recovery may consist of stabilizing the population at a lower level than before the spill.

Where there were little prespill data, injury is inferred from comparison of oiled and unoiled areas, and recovery usually is defined as a return to conditions comparable to those of unoiled areas. Because the differences between oiled and unoiled areas may have existed before the spill, statements of injury and definitions of recovery based on these differences often are less certain than in those cases where prespill data exist. However, there also can be some uncertainty associated with interpreting the significance of prespill population data because populations undergo natural fluctuations. Indicators of recovery can include increased numbers of individuals, reproductive success, improved growth and survival rates, and normal age and sex composition of the injured population.

Birds

The following factors and assumptions were considered when evaluating alternatives and actions concerning injured bird resources: (1) valuations of land that may be acquired for habitat were based on criteria and a process developed by the EVOS habitat group; (2) prespill baseline data are meager or nonexistent for most species; (3) population size depends on many biological, ecological, and environmental factors, and population size changes as a result of lifespan, productivity, and survival rate; (4) populations cycle in response to environmental cycles; (5) it is unknown whether or how a 19-year climatic cycle in the Gulf of Alaska has affected populations; (6) migrants may be influenced by environmental factors far from the EVOS area; (7) population cycles are barely known for most species; and (8) the influence of commercial-fishing activities on seabird populations in the EVOS area are unknown, but could be substantial. For example, fishery harvests and hatchery programs could influence seabird populations in three ways: (1) prey may become less available to seabirds because fish species that occupy the same trophic levels may outcompete seabirds;

(2) an increase in abundance of salmon fry and smolts may increase seabirds' prey base; and,
(3) offal and discarded bycatch may increase the food base of scavenging seabirds.

Fish

Fishery resources that are included for analysis in this EIS are pink and sockeye salmon and Pacific herring. Related services that are included are sport and commercial fishing. Actions that may be proposed as general restoration projects as part of the programs described for each alternative will have a benefit ~~for restoring or replacing for~~ one or several of the fishery resources or ~~services~~. Forecasted feasibility, results, benefits and costs from each of these actions, however, are highly site specific, vary annually, and are difficult to quantify. Consequently, analyses and predicted impacts presented here must be general in nature. The proposed actions are intended primarily to benefit wild-stock fishery resources, either directly by habitat or population manipulations or indirectly by providing an alternate opportunity for user groups to reduce pressure on the wild stocks to allow them to recover.

and thereby the services they provide

Each proposed action for these fishery restoration or replacement projects is based on the basic premise that some factor or habitat need in the life history of a fish either limits the size of the population or is missing. For example, if spawning habitat is absent, there can be no fish; if spawning habitat is present (and no other factor constrains the size of the population), the number of fish will depend on the amount of spawning habitat, but it will vary annually according to environmental conditions. The basic concept for each proposed action, therefore, is to identify and overcome a limiting factor or "bottleneck" that will result in an increase in the total number of adult fish that will return to a particular home stream.

Economy

The economic analysis for the five alternatives is a combination of qualitative and quantitative approaches. The economic analysis is focused on three sectors of the economy of most concern: forestry, commercial fisheries, and recreation. Taking timberlands in or out of production is quantified in terms of dollars and jobs. However, studies and data on the economic effect of the types of actions proposed in the alternatives on the commercial fisheries and recreation are not adequate to make quantitative projections.

The Forest Service's IMPLAN (IMpact PLANning) economic computer model was used in the quantitative analysis of the economic impacts of implementing each of the proposed EVOS Restoration Plan alternatives. Alternatives 1 through 5 are compared to the "baseline" economic conditions in 1990 found in Table 3-3, Chapter 3.

An attempt has been made to quantitatively analyze the recreation sector of the economy in the tables generated by IMPLAN. Discrete data are not available for the recreation industry. For example, data are available for hotels, but a differentiation is not made between recreational visitors and business visitors. The recreation-related sector shown in the tables on economics are composed of several IMPLAN subcategories: local transit, water transportation, air transportation, transportation not elsewhere classified, hotels, auto rental, and recreation services not elsewhere classified. Where the term recreation is used in economic analysis, it includes tourism.

The IMPLAN as applied to this analysis for the forestry sector shows the negative effects in output and employment when timberlands are purchased and timber is not harvested. There

4 Environmental Consequences

is a corresponding increase in the services sector output and employment because of expenditures in that sector by the owners of the timberlands. Restoration expenditures have a direct effect on the construction sector.

The descriptions of the alternatives are general. This, combined with the lack of data to quantify the economic effects for the commercial fisheries and recreation sectors, results in an inability to distinguish the economic effects among the alternatives.

The IMPLAN is an economic model that is the best economic tool for analyzing the economic effects of the alternatives analyzed in this draft environmental impact statement (DEIS). However--as with any tool of economic projection--even when quantified data is available for analysis, IMPLAN is not perfect. While exact numbers of various economic measures are the outputs of the model, the results are not intended to be precise measurements. The projections from the model represent approximations of the economic future.

The IMPLAN estimates in income and employment change as the product of the demand changes (e.g., an alternative) and a multiplier. Estimating multipliers requires data and a description of the regional economy. The data are the National input-output matrices that show the dollar volume of transactions among industries and final demand. The National matrices are stepped down to the borough and census-area level by using borough population and employment data and ratios of employment to output. The boroughs and census areas aggregated in this assessment are the Municipality of Anchorage, Kenai Peninsula Borough, Kodiak Island Borough, and the Valdez-Cordova Census Area. This area encompasses the EVOS area and the closest major economic center (Anchorage). The Municipality of Anchorage was included to ensure that the flow of goods and services in and out of the oil spill area is adequately accounted for in the IMPLAN economic model.

The key assumptions in the IMPLAN economic assessment are as follows: each industry has an output, and this output does not experience short-term variation; there is a fixed formula for making commodities, and there can be no substitutions; there are only constant returns to scale (i.e., to make twice as much of something, all inputs are doubled); adjustments are instantaneous, and timeliness and technology do not change.

For each Restoration Plan alternative, the amount of funds allocated for each expenditure is divided among restoration activities and the economic sector participating in those activities, as shown in Table 4-1, Allocations for Economic Analysis.

Assumed for purposes of

See Appendix D for a further description of the methodology of economic analysis.

Archaeological/ Cultural Resources

While it is recognized that archaeological resources were injured as a result of the EVOS, this report incorporates various aspects of cultural resources relating to the physical remains of indigenous and historic inhabitants of the EVOS area and the values inherent in those remains for contemporary and future members of the public. Restoration actions are oriented toward physical remains because those were directly injured by the EVOS. The values of these remains for local communities, whose ancestors lived and are buried at some of these sites, would be addressed through actions relating to those remains. Archaeological sites and artifacts themselves are important kinds of cultural resources, but other cultural resources such as stories associated with specifice sites or artifact types, or traditional

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Assumed purposes of

Table 4-1
Allocations for Economic Analysis

Restoration Category/ Economic Sector	Alternatives 1	2	3	4	5
Administration[1]	$0	$2,178	$3,267	$3,911	$1,000
Federal Government	50%	50%	50%	50%	50%
State & Local Gov't.	50%	50%	50%	50%	50%
Monitoring[1]	$0	$2,722	$3,811	$4,356	$11,621
Federal Government	33%	33%	33%	33%	33%
State & Local Gov't.	34%	34%	34%	34%	34%
Universities	33%	33%	33%	33%	33%
Restoration[1]	$0	$0	$6,534	$19,056	$5,534
State & Local Gov't.	-	-	33%	33%	33%
Fisheries Services	-	-	34%	34%	34%
Construction	-	-	33%	33%	33%
Habitat Protection[1]	$0	$34,900	$31,285	$26,331	$26,420
Real Estate	-	0.5%	0.4%	0.3%	0.3%
Forestry	-	99.5%	99.6%	99.7%	99.7%
Restoration Reserve[1]	$1,906	$0	$0	$0	$329
Banks	100%	-	-	-	100%
Respending by Landowners[1]	$0	$29,418	$23,296	$13,433	$13,300
Securities	-	13%	13%	0%	0%
Construction	-	29%	29%	40%	40%
Social Services	-	29%	29%	40%	40%
Household Spending	-	29%	29%	20%	20%

[1] 1990 Dollars (X 1,000)

4 Environmental Consequences

Alternative 1 - No Action

Introduction

The No Action Alternative is required by ~~NEPA~~ CEQ guidelines to provide a basis for comparing the impacts of the other proposed alternatives. In this DEIS, the No Action Alternative describes what would happen to the resources and services injured by EVOS if no restoration actions were implemented. Because none of the civil settlement funds would be spent to aid recovery, the only actions undertaken within the spill area would be the result of normal agency management or private enterprise. For biological resources, recovery from oil spill injuries would be unaided (natural recovery) and could be complicated by other human activities that could cause further injuries or habitat loss. The recovery of other resources or services also may be influenced by other nonoil spill-related actions.

Biological Resources

Impact on Intertidal Resources

The intertidal zone was especially vulnerable to injury from the EVOS and from the subsequent cleanup operations. The oil spill caused population declines and sublethal injuries to the plants and animals of the intertidal zone. Portions of 1,500 miles of coastline were oiled (350 miles were heavily oiled), resulting in significant impacts to intertidal habitats, particularly in the upper intertidal zone. Direct oiling killed many organisms, but beach cleaning, particularly high-pressure, hot-water washing, had a devastating effect on intertidal life (Houghton, Lees, and Driskall, 1993).

Coastal habitat studies documented changes in many species of algae, invertebrates, and fish; the injuries were highly variable between species, regions, and habitats (Highsmith et al., December 1993). For most of the intertidal zone, the effects of the oil spill were probably short term. Studies in 1992 and 1993 showed that many of the differences in habitats and organisms that were documented in 1989 and 1990 were recovered (Houghton, Lees, and Driskall, 1993; Highsmith et al., December 1993). However, some areas had not yet begun to recover or were recovering very slowly. This was especially evident in the upper 1 meter vertical drop (MVD) of sheltered rocky habitats where the algae *Fucus gardneri* is the dominant plant species (Highsmith et al., December 1993; Highsmith et al., October 1993; Houghton, Lees, and Driskall, 1993). This discussion focuses on the organisms and habitats that are the least likely to have recovered.

Fucus

This algae, or rockweed, is an important component of the upper intertidal zone because it provides food for many invertebrates, as well as shelter from predation and desiccation for many plants and animals (Highsmith et al., October 1993). The oil spill and subsequent cleanup destroyed many of the plants in the upper meter and reduced the reproductive capacity of the adult plants that survived (Highsmith et al., October 1993). These injuries were documented in all regions of the spill area but were highly variable between tidal elevations (MVD) and habitats (Highsmith et al., December 1993).

The Herring Bay Experimental and Monitoring study (Highsmith et al., October 1993) provided information on the recovery of plants and invertebrates in the intertidal zone.

the Nation's spirit of religious protection, historic preservation, and archaeological knowledge as expressed in numerous laws and their implementing regulations.

In their current state, cultural properties in the spill area are in danger of vandalism, looting, and erosion. Erosion destroys the context by which archaeologists identify, classify, and explain sites, sometimes leaving only a few artifacts as clues. This has occurred largely as a result of disturbance to vegetation that stabilizes deposits exposed to the ocean or streams. These exposed artifacts are then subject to weathering and may be completely destroyed or carried off by casual visitors or looters. Exposure of artifacts also may spark the interest of visitors otherwise unaware of archaeological remains at a site, prompting unpermitted and damaging digging or collecting.

Vandalism already has seriously affected some sites. Key diagnostic artifacts have been illegally taken, ancient burial sites have been violated, and potholes dug by looters have destroyed critical evidence contained in the layered sediments. The exact extent of the vandalism as compared with the effect of the oil spill response on cultural resources has been determined only in a few cases, but it is documented that vandalism is a serious threat to cultural properties.

Should the No Action Alternative be selected, injuries will not be repaired to any degree through stabilization of eroding sites, nor would eroded artifacts be removed, restored (if oiled), and stored in an appropriate facility. Sites and artifacts would not be protected from further injury from looting and vandalism. The actual extent of damage would not be known because no monitoring would be done. Sites would not be excavated in order to retrieve scientific and cultural knowledge before irreparable damage ensued.

Short-term effects would include the loss of all or part of at least 24 sites within 10 years. In the long term, 10 years and beyond, increased public knowledge of site locations (knowledge spread as a result of the oil spill response) will escalate the level of looting and vandalism. For the purposes of this analysis, 10 years will be considered long term because the available information does not allow for reasonable estimates of effects beyond that time. The estimated long-term effects of this alternative are expected to extend to beyond the estimated 113 sites already damaged because of increased knowledge of site location. Also, a documented increase in numbers of visitors will translate to increased impacts on sites, whether or not such impacts are intentional.

Conclusions. Under this alternative, cultural resources in the spill area would not be protected, enhanced, or understood better than at present. Over the long term, this would constitute a low level of negative impact to archaeological and historical sites and to the understanding and appreciation of cultural resource values as they apply to the spill area. Over the short term, the impacts of this alternative would be negligible. Benefits to cultural resources would be negligible in the short term and in long term.

Subsistence Uses

If no ~~projects are funded that would facilitate either (1) the~~ restoration activities occur to assist in the recovery of species on which subsistence users depend ~~or (2) the recovery of subsistence users' confidence in the lack of health risk associated with subsistence use;~~ present trends in subsistence use will continue. In the short term, the effect of this alternative would be negligible. The level of subsistence

4 Environmental Consequences

harvest, as measured in pounds per person, would continue rising to, or beyond, prespill levels in some communities. Harvest levels would remain at below prespill levels in other communities, with the Native villages of Tatitlek, Chenega Bay, and Ouzinki at most risk of continued lowered harvest levels. Under this alternative, lands in the spill area that now provide important habitat for some subsistence species would remain unprotected from extractive economic activities like logging and mining. Should those activities happen in environmentally sensitive areas, the ensuing degradation of habitat ~~would~~ cause additional instability in the populations of species important for subsistence, possibly leading eventually to reduced populations of target species and reduced levels of subsistence activities. This would be a long-term high-level negative effect. Long term, for the purposes of this analysis, is considered 10 years because present information does not allow a reasonable projection of conditions beyond that length of time.

A major long-term effect of this alternative to subsistence is the continued uncertainty of the safety of subsistence foods. There is a persisting fear of remaining contamination in traditional foods. This ~~would~~ cause continued stress to community members and further degradation of subsistence lifestyle as younger people (1) are not taught the methods and attitudes that accompany subsistence activities and (2) become more dependent on imported foods.

Even if species on which subsistence users depend were to recover unassisted over the long term, the negative effect of the hiatus in subsistence as it relates to reintegration of cultural values into the communities would be high. These cultural values are intertwined with stories, lessons, techniques, history, place names, and so on that are relevant only in the context of subsistence activities. They are not passed on outside of that context and are impossible to fully reconstruct if not passed down.

Conclusions. In the No Action Alternative, the existing trends in subsistence harvest species populations and subsistence use are likely to continue over the long term. A continued hiatus in subsistence activities would have a long-term, potentially permanent negative effect on the perpetuation of cultural values within some of the villages in the spill area. Short-term and long-term benefits to ~~subsistence species or subsistence use~~ would be negligible.

Recreation and Tourism

The No Action Alternative would have negligible effect on recreation or tourism in the short term. Present trends of increased levels of tourism and shifts in recreation locations and activities would continue. These trends include higher visitor rates, especially tourist user groups such as cruise ship passengers, State Ferry passengers, and lodge guests. They also include shifting of recreation activities away from oiled beaches.

Damage to tourism came from two main sources: damage to natural resources negatively affecting people's desire to visit the area and displacement of usually tourist-oriented services to spill-oriented services.

The oil spill is estimated to have caused the potential loss of 9,400 visitors for the summer of 1989, representing $5.5 million in in-State expenditures. However, strongly spill-related business in some of the major cleanup areas such as Kodiak, Homer, Seward, Valdez, and Anchorage gained business as a result of the oil spill. Business sectors like hotels/motels, car/RV rentals, and air taxi and boat charters were among those to benefit. For these

businesses, business otherwise lost through lack of vacation/pleasure visitors was offset through cleanup-related business. The large decline in business for tourism associated with 1989 were less severe in 1990, with 12 percent of businesses indicating negative impacts. Negative impacts continued through 1990, with fewer bookings as a result of the spill, particularly among fishing lodges in Southwest Alaska (McDowell Group, 1990). The No Action Alternative would not cause a reduction in the trend of tourism-related business regaining prespill service levels and so is likely to have no effect.

Because oil fouled beaches, there was and still is a reduction of quality destinations available to some recreation users. There also was a reduction in ~~quality and~~ quality of remote destinations in the spill area because cleanup activities inserted people, noise, and large motorized equipment throughout the spill area and disturbed the area's undeveloped and normally sparsely occupied landscape. This is no longer a significant effect in the spill area because the level of cleanup activity has decreased dramatically. However, some materials used during cleanup remain dispersed throughout the spill area, and the effects of having so many people on the shores and adjacent uplands remain visible in many places. In the No Action Alternative, no funds would be expended to conduct activities that would reduce these effects.

Public-use cabin rentals and visitor-use data from the State of Alaska, Chugach National Forest, and Kenai Fjords National Park show fewer visits in some of the spill area in 1989 an 1990. Decreased use is an injury to those who would like to have used the area but avoided it because of the spill. Some recreation users were temporarily or permanently displaced from their customary or preferred sites due to spill-related changes such as crowding, presence of oil, or other factors. As a result of the oil spill, others changed the type or location of recreation use in which they historically engaged. While fewer people visited some areas, other areas experienced increased use. In some cases, increased use is causing additional resource damage and decreased enjoyment of overused areas.

Under the No Action Alternative, no actions would be taken to readjust shifted use patterns. In the short term, this would have negligible effect. However, in the long term, continued decreased use in some areas would continue. Also in the long term, overuse of some areas would lead to further shifting of recreation activities as overuse areas become no longer desirable. This would decrease visitor satisfaction and place greater stress on land owners (both public and private) to reduce impacts to new, potentially unauthorized areas. New areas may be on or near sensitive locations: habitat for recovering or protected species, traditional subsistence use areas, or cultural sites.

The oil spill caused injury to the way people perceive recreation opportunities in the spill area. Public comment indicates that people experienced an increased sense of vulnerability of the ecosystem in regard to future oil spills and erosion of wilderness character. There is a continued sense of permanent change, including unknown or unseen ecological effects and complete disruption of the ecosystem and contamination of the food chain.

People who used the spill area before the oil spill occurred generally have greater perceptions of injury than first-time recreation users of the spill area. Perceptions are changed more often for shore-based recreation users than those who remain on vessels. The No Action Alternative will not, in the short term, affect people's perceptions of recreation opportunities in the spill area. Over the long term, people's perceptions of recreation

opportunities are tied to the recovery of natural resources in the spill area. Some displaced users are returning to the spill area, and if more species recover and evidence of oil and cleanup dissipate, then perceptions of opportunities for recreation in the spill area will be enhanced. The converse is true as well--if natural resources do not recover, perceptions of injury to recreation opportunities likely will not improve.

X

If this alternative is selected, logging and/or mining is likely to occur throughout the spill area. This ~~would~~ is expected to have a long-term negative effect on recreation and tourism. The effect would be twofold, including more direct and less direct aspects. The direct aspects are those that reduce the immediate recreation quality. These include such things as reducing the visual quality of relatively undeveloped landscape (the uncut and unscarred hillsides, wildlife viewing opportunities), and the insertion of people and machinery into the natural setting (mechanical action and noise). The indirect effects on recreation are those that affect the ecosystem on which these services depend, including reduction in wildlife habitat.

There are some long-term effects that differ ~~between~~ among user groups. Tourist user groups (cruise ship passengers, ferry passengers, lodge guests, and boaters who do not often put to shore) will experience low to zero level of impact from the residual effects of the EVOS. Tourist services will continue to increase as new facilities are developed, adding time to long-term recovery unless extensive mining and logging occur. This is in contrast to remote and dispersed recreation (those activities like kayaking, beachcombing, and motor boating, where people spend considerable time in the intertidal and adjacent coastline zones), which are likely to experience continued negative impact in the long term. Shifting of recreation activities from oiled to nonoiled areas is likely to continue on a long-term basis, thereby impacting specific areas and facilities through continued human use.

Some recreation facilities were injured by the spill, most from overuse or misuse during 1989 and 1990. The No Action Alternative will not affect this injury in the short term, but the long-term scenario would be of continued damage, leading to closure or destruction of affected facilities.

Conclusions. The short-term impacts--negative or positive--of the No Action Alternative on recreation and tourism would be negligible. Long term, there would be low negative impacts to tourism and moderate negative impacts to recreation. Long-term benefits to recreation and tourism would be negligible.

Wilderness

Designated Wilderness and Wilderness Study areas will have recovered when oil is no longer encountered in these areas and the public perceives them to be recovered from the spill. This alternative will develop no means to address the presence of oil or public perceptions of recovery in Wilderness areas. This will accrue a negligible short-term effect. The long-term effect will be persistence of oil in designated Wilderness areas and Wilderness Study areas, although these pockets of oil are expected to eventually weather to a level of insignificance. Public perception of damaged Wilderness will persist as well.

Conclusions. The short-term negative impact to Wilderness and Wilderness Study areas would be negligible. The long-term persistence of oil and public perceptions of damage would be a moderate-level negative impact. The long-term benefit to Wilderness would be negligible.

Commercial Fishing

If there ~~is no action to develop new alternate commercial fisheries or~~ to ~~augment~~ injured commercial fisheries, the recovery of these fisheries will depend solely on the natural recovery of the injured pink salmon, sockeye salmon and Pacific herring populations and normal conservative management practices of the responsible agency. Most commercial fisheries in the *Exxon Valdez* oil-spill area will most likely be managed very conservatively by the resource manager until the injured resource populations are demonstrated or are believed to be recovered. This attitude may persist for 10 to 50 years depending on the injured resource and the specific population and any real or perceived uncertainty about the status of the recovery of these populations by the management agency will be reflected in a more conservative approach to the management of the resource. Fish habitat protection to maintain normal rates of production will rely solely on protective actions of normal resource agency planning and permitting procedures (Appendix C).

Conclusions.

- short-term. Negligible. No observable improvements within one life cycle.
- long-term. Moderate. Recovery can be expected through the natural process although some areas or commercial fisheries may not recover to pre-spill conditions and some populations will recover sooner than others.

Sport Fishing

If there is no action to restore ~~lost~~ sport fishing ~~opportunities, provide new opportunities or augment existing opportunities,~~ the recovery of this service will depend upon natural rates of population and ecosystem changes and natural rates of recovery of the injured populations of cutthroat trout, Dolly Varden, and sockeye and pink salmon and normal management activities of the responsible management agency. Any uncertainty by the fishers or the resource manager about the recovery of these resources will result in more conservative actions.

Conclusions.

- short-term effects. Negligible. No improvements are expected within one life cycle.
- long-term effects. Moderate. Some resources and some populations will recover sooner than others, and some resources or populations may never recover to pre-spill levels. Confidence in the rates of recovery will be low without monitoring. Real or perceived recovery of the injured resources and services may require 10 to 20 years.

Impacts on the Economy

Qualitative analysis indicates that Alternative 1 will result in moderate negative economic effects in commercial fisheries and recreation and moderate economic benefits in forestry as a result of timber harvesting. Quantitative analysis reflects effects resulting from habitat acquisition on forestry and other sectors but not effects on commercial fishing and recreation because data are not available to quantify in these sectors. The quantitative analysis follows.

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available for restoration

The title "No Action Alternative" is somewhat misleading with respect to economic impacts. Under Alternative 1, no lands would be purchased for habitat or facilities would be constructed or ~~services purchased~~ for restoration. However, it is assumed for the purpose of economic analysis for this alternative that the $620 million would be invested. Therefore, as indicated in Table 4-3 , Alternative 1, the ~~most significant~~ economic effects are in the finance, insurance, and real estate sector, for which there is a $1.6 million increase, and in the services sector, for which there is a $76 million increase. The total increase in output is $3 million. The employment increase is 21 in finance, insurance, and real estate and 15 in services. The total increases for all sectors are $3.04 million for output and 47 jobs.

because this alternative assumes such activities will not occur.

Habitat acquisition and general restoration expenditures will have economic benefits for the commercial fisheries and recreation sectors of the economy. However, these benefits are not reflected in the IMPLAN projections presented in Table 4-3. Therefore, this table does not quantify important economic benefits in commercial fishing and recreation because these benefits are not quantified. Of the three most important economic sectors for this analysis, only forestry is quantified. The typical projects in various combinations, such as fish ladders, fish hatcheries, and preservation of habitat will economically enhance the commercial fisheries and recreation sectors of the economy. However, because studies and data are not available that quantify in terms of dollars or employment, it is not possible to quantify the economic effects for these two sectors of the economy. In Table 4-3 the quantities for the commercial fisheries and recreation sectors are reflections of the indirect effects of other sectors of the economy only; they are not reflections of the anticipated but unquantified effects on those sectors.

See the introduction to economics in Chapter 4 and Appendix D, Economics Methodology, for a more detailed discussion of methodology.

Conclusions. Qualitative analysis indicates that Alternative 1 will result in moderate negative effects in commercial fisheries and recreation. Quantitative analysis reflects effects resulting in several sectors from investment but not effects on commercial fishing or recreation. Quantitative analysis indicates that Alternative 1 results in annual averages in output for a 10-year period in increases of $1.6 million for the finance, insurance, and real estate sector; $76 million in the services sector; and $3 million for all other sectors. Employment increases jobs by 21 in the finance, insurance, and real estate sector; 15 in services; and 47 total.

4 Environmental Consequences

Alternative 2: Habitat Protection

Introduction

This Alternative focuses on increasing the protection of the greater EVOS ecosystem through protecting strategic lands and habitats important to resources and services injured by the spill. In this alternative, 91 percent of the remaining settlement funds would be used for habitat acquisition and protection. Title acquisition, conservation easements, and other less-than-fee-simple methods would be used to provide protection to habitats on private lands. Increasing the protection of habitat throughout the oil-spill area will be beneficial to the entire ecosystem by reducing further habitat degradation that may compound the effects of the oil spill. Monitoring activities would follow the progress of natural recovery for the injured resources.

Impacts on Biological Resources

Impact on Intertidal Resources

In this alternative, the restoration program concentrates exclusively on habitat protection actions that prevent or reduce habitat loss and disturbance to resources and services injured by the EVOS. This analysis considers the impacts of protecting the 81 upland parcels described in the Comprehensive Habitat Protection Process: Large Parcel Evaluation & Ranking Volume I and Volume II (EVOS Restoration Team, 1993). Smaller parcels that also may be considered for protection under this alternative currently are under evaluation and are not discussed in this analysis.

The habitat protection process used to evaluate the 81 parcels for their potential benefits to injured resources and services combined intertidal and subtidal biota and used the following criteria for ranking the parcels:

- "High" for parcels adjacent to areas with a known high species abundance and diversity; high quality habitat for intertidal and subtidal biota;
- "Moderate" for parcels adjacent to extensive intertidal habitat with observed or probable moderate species diversity and abundance; and,
- "Low" for parcels with little intertidal habitat with low species abundance (EVOS Restoration Team, 1993).

Of the 81 parcels evaluated using these criteria, 25 of the parcels were ranked High, 33 were ranked Moderate, 19 were ranked Low, and 4 were not associated with the coastline and had no rating for intertidal/subtidal organisms (EVOS Restoration Team, 1993).

The benefits to intertidal and subtidal organisms through the protection of upland habitats comes in two forms. First, the protection can prevent the intertidal and subtidal areas from being altered by the actions that may occur on the parcels. Some actions can cause indirect adverse effects through siltation or increased pollution, while other actions such as the construction of a dock or creating a new harbor, directly could alter the intertidal and subtidal

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Harlequin Duck

Habitat Protection. Potential nesting habitat of harlequin ducks will be receive maximum protection under this alternative, thus enhancing productivity and recovery of their depleted populations. However, there is very little information available on use of specific land parcels by harlequin ducks, so it is difficult to determine the significance of acquisition of specific parcels on harlequin duck population recovery.

Conclusions. The short-term effects through 1995 of land acquisition on harlequin duck recovery are likely to be negligible, and populations likely would remain stable at 1990 to 1993 levels in both oiled and nonoiled areas. The long-term effects of this alternative would be to maximize the reproductive potential of harlequin ducks in the EVOS area.

Murres

Habitat Protection. Acquisition of habitat would have little benefit to the injured murre population, because there are no sizeable colonies and very few smaller colonies that are not already protected. A seabird colony on privately owned Gull Island in Kachemak Bay has a small number of common murres, and it is a tourist attraction that several commercial tour boats visit daily in summer.

Conclusions. Acquisition of Gull Island would ensure protection of this ~~popular tourist attraction~~ colony, and thus may have a moderate long-term benefit to murres. However, because there appears to be no imminent plans to develop this small, rocky island, there would be little short-term benefit.

Pigeon Guillemot

Habitat Protection. In Prince William Sound, the large majority of pigeon guillemot colonies are on U. S. Forest Service (USFS) land (Sanger and Cody, written comm., 1994) that is not slated for logging (Frey, written comm., 1994). Two of the largest colonies in Prince William Sound, at The Pleiades and on Bligh Island, totaling approximately 3 percent of the 1993 breeding population, are on private land (Sanger and Cody, written comm., 1994). In the 1970's, both of the latter colonies probably harbored larger numbers of nesting guillemots than at present. There are two colonies adjacent to private land that currently is being logged on the eastern, nonoiled portion of Prince William Sound, but they had very few guillemots in 1993; it is unlikely that they were affected by the inland logging operations (Sanger and Cody, written comm., 1994). Outside of Prince William Sound, the Seal Bay area on Afognak Island has low numbers of pigeon guillemots and has already been acquired; little is known about the current status of guillemot colonies elsewhere in the EVOS area (USFWS, 1993).

Conclusions. Habitat acquisition would have little effect on pigeon guillemot population recovery on the short term, because there appears to be no development slated for private land with known colonies. On the long term, acquiring habitat where two of the largest colonies in Prince William Sound are located would have a moderate benefit in allowing population recovery and in preventing further inroads to the injured population through habitat degradation.

Marbled Murrelet

Habitat Protection. Details of habitat use by marbled murrelets are being clarified, and studies in Prince William Sound are showing that large, moss-covered limbs of old-growth conifers comprise prime nesting habitat. Current and possible future logging of such habitat on private land is the single greatest threat to population recovery of marbled murrelets, and it poses the additional threat of reducing the population more. Acquisition of prime nesting habitat would thus maximize the potential for the injured marbled murrelet population to recover while preventing further injury to the population.

Conclusions. Depending on the potential for imminent logging on land parcels that contain prime habitat, the short-term effects of land acquisition could be considerable. On the long term, acquisition of old-growth-forest habitat ~~would~~ have a high benefit for enhancing murrelet population recovery. is expected to

Fish

Pink Salmon

Alternative 2 includes only one restoration action to assist natural recovery of wild-stock pink salmon populations: habitat protection and acquisition (EVOS Trustee Council, 1993).

Habitat protection criteria for parcels that may benefit pink salmon include ratings of High for parcels with a high density of pink salmon streams or streams known to have exceptional value; Moderate for parcels with an average density of pink salmon streams or streams with average production, and, Low for parcels with few or no pink salmon streams or streams with no production (EVOS Restoration Team, 1993).

Forecasted habitat protection that may benefit wild-stock pink salmon populations, according to Alternative 2, includes purchase of all available parcels. This is expected to provide low to moderate benefit for the pink salmon resource (Appendix A). Of the 81 parcels that may be purchased from the estimated budget that is forecasted for this alternative, 0, 38, 25, and 18 have been rated as no, low, moderate, and high value, respectively, for pink salmon. Although the average value of forecasted habitat acquisition may not have a high overall rating for pink salmon, individual parcels may have exceptional value. In the event that some of these parcels may not be protected through acquisition, the habitat will continue to have some measure of protection through the protective actions of normal resource agency planning and permitting requirements (Appendix C).

Conclusions. (for the pink salmon resource)

- short-term: Negligible. No benefits from habitat protection would be accrued within one lifecycle.
- long-term: Moderate. Habitat protection and acquisition actions would have a long-term value to pink salmon stocks in the EVOS area by helping to ensure maintenance of wild-stock production. More than half of the parcels that may be purchased have moderate or high value for pink salmon.

archaeological properties are not fully known, so inadvertent damage or destruction to undiscovered sites would be reduced in this alternative.

There are 1,287 known archaeological or historical sites in the spill area. While it is estimated that between 2,600 and 3,137 sites are present, those estimates are based on a minimal inventory. While archaeological surveys were conducted along much of the shoreline of the EVOS area, very little work has been accomplished in the uplands before, during, or since the spill and resulting cleanup. Because there is so little knowledge about the cultural resources in the spill area, and because many of these sites contain human remains important to specific groups of people, any actions taken to significantly protect these resources from damage will be considered a high benefit to the resource. This alternative would affect all of the parcels and additionally could establish the basis for inventorying lands upland from the intertidal zone. This alternative would not in itself provide any new information about cultural resources in the spill area but would help ensure the potential for gaining new information in the future.

is expected to

Conclusions. The short-term direct benefit of habitat protection and acquisition on cultural resources would be low. Long term, this alternative ~~would~~ provide moderate benefit to the protection of archaeological and historical resources on acquired parcels.

Subsistence USES

It is assumed here that 81 large parcels, a total of 863,100 acres, would be purchased. These parcels contain low (status as a subsistence-use area is unknown); moderate (known historic subsistence-use area, which may be used again); or high (known current subsistence-use area) potential for benefiting subsistence as analyzed by the Habitat Protection Work Group (November 30, 1993). If low potential benefit on a parcel is assigned a value of 1, moderate potential benefit a value of 2, and high potential benefit a value of 3, these parcels average 2.4 (or between moderate and high). Under this alternative, there will be no change in subsistence regulations, activities, or locations. This means there will be no direct short-term benefits. Indirect effects include further protection of habitat from potential degradation from extractive economic activities. As this alternative is intended to enhance the ability of the environment in the EVOS area to restore plants and wildlife, it also would enhance the area's capability to support plants and animals for subsistence harvest in the long term. The degree to which this is true depends on the location of acquired land. Some lands under consideration are excellent habitat for subsistence ~~foods~~ while others are less productive; so, effects are likely to be local enhancements of some species populations. Discussion of the effect of this alternative on each of the species important for subsistence is included elsewhere. Please refer to those sections for additional information. ~~The perception of continued contamination of subsistence food resources will not be addressed by this alternative.~~

resources used for

Conclusions. Short-term impacts to subsistence-harvest species and subsistence users would be negligible. Long term, the level of parcel acquisition possible in this alternative would allow for localized increases of populations of fish, wildlife, and intertidal resources important for the perpetuation of subsistence activities and their associated lifestyle in the spill area. This would be a long-term low to moderate benefit to subsistence.

thereby

4 Environmental Consequences

Alternative 3: Limited Restoration

Introduction

In this alternative, the general restoration program focuses only on the components of the ecosystem that were most injured by the oil spill. General restoration actions are sometimes able to help resources or services recover to their prespill conditions more rapidly than if the actions were not implemented. The general restoration program would be limited to the most effective actions in order to maximize the available funds for habitat protection activities. Habitat protection and acquisition can provide protective benefits to all resources and services injured by the spill as well as to other resources and human uses that are important to the greater EVOS ecosystem. Increasing the protection of habitat throughout the oil spill area would be beneficial to the entire ecosystem by reducing further habitat degradation that may compound the effects of the oil spill. The Monitoring and Research Program would evaluate the effectiveness of restoration actions and follow the recovery progress of the injured resources and services.

Impacts on Biological Resources

Impacts on Intertidal Resources

There are three actions that affect the intertidal zone that have been identified for this alternative--habitat protection, accelerating the recovery of *Fucus* in the upper intertidal zone, and cleaning oiled mussel beds.

Habitat Protection. Although there are several types of actions that apply under this restoration category, this analysis considers only the types of benefits that may be gained from protecting the 81 upland parcels identified in the Comprehensive Habitat Protection Process: Large Parcel Evaluation & Ranking, Volumes I and II (EVOS Restoration Team, 1993). Other aspects of the habitat protection category, such as the small parcels available for protection, are still being developed and cannot be analyzed in this DEIS.

The habitat protection process used to evaluate the 81 parcels for their potential benefits to injured resources and services combined intertidal and subtidal biota and used the following criteria for ranking the parcels:

- "High" for parcels adjacent to areas with a known high species abundance and diversity; high quality habitat for intertidal and subtidal biota;
- "Moderate" for parcels adjacent to extensive intertidal habitat with observed or probable moderate species diversity and abundance; and,
- "Low" for parcels with little intertidal habitat with low species abundance (EVOS Restoration Team, 1993).

Of the 81 parcels evaluated using these criteria, 25 of the parcels were ranked high, 33 moderate, and 19 low, and 4 were not associated with the coastline and had no rating for intertidal/subtidal organisms (EVOS Restoration Team, November 1993). If a higher cost per acre is assumed for the protection of these parcels, fewer of the parcels that were ranked

E
EIS

To: EIS Team.

I have read and reread the comment by John F. on page 10, chapter 4, attached. I am still not certain what it means, but my translation is Para 1, below. Para 2 provides an expansion and Para 3 may also be useful. I think that we need to talk about this and I am not comfortable with John's replacement statement.

The No Action Alternative is required by NEPA to provide an understanding of what may occur if no actions are implemented to restore the injured resources to pre-spill conditions.

(It is intended to be a forecast or projection of conditions from the present status of the injured resources [i.e., Draft Restoration Plan] to a future status if no actions are taken.)

It will also provide additional background for analysis and comparison to forecast impacts from actions of other alternatives.

Sorry... I didn't intend to remain so anonymous -

Bill Hauser

provide understanding of what may occur if the proposal is not adopted. It is a forward impact projection of the existing levels of action/no-action in being at the time of the proposal.

or projected.

Alternative 1 - No Action

Introduction

The No Action Alternative is required by NEPA to ~~provide a basis for comparing the impacts of the other proposed alternatives~~. In this DEIS, the No Action Alternative describes what would happen to the resources and services injured by EVOS if no restoration actions were implemented. Because none of the civil settlement funds would be spent to aid recovery, the only actions undertaken within the spill area would be the result of normal agency management or private enterprise. For biological resources, recovery from oil spill injuries would be unaided (natural recovery) and could be complicated by other human activities that could cause further injuries or habitat loss. The recovery of other resources or services also may be influenced by other nonoil spill-related actions.

Biological Resources

Impact on Intertidal Resources

The intertidal zone was especially vulnerable to injury from the EVOS and from the subsequent cleanup operations. The oil spill caused population declines and sublethal injuries to the plants and animals of the intertidal zone. Portions of 1,500 miles of coastline were oiled (350 miles were heavily oiled), resulting in significant impacts to intertidal habitats, particularly in the upper intertidal zone. Direct oiling killed many organisms, but beach cleaning, particularly high-pressure, hot-water washing, had a devastating effect on intertidal life (Houghton, Lees, and Driskall, 1993).

Coastal habitat studies documented changes in many species of algae, invertebrates, and fish; the injuries were highly variable between species, regions, and habitats (Highsmith et al., December 1993). For most of the intertidal zone, the effects of the oil spill were probably short term. Studies in 1992 and 1993 showed that many of the differences in habitats and organisms that were documented in 1989 and 1990 were recovered (Houghton, Lees, and Driskall, 1993; Highsmith et al., December 1993). However, some areas had not yet begun to recover or were recovering very slowly. This was especially evident in the upper 1 meter vertical drop (MVD) of sheltered rocky habitats where the algae *Fucus gardneri* is the dominant plant species (Highsmith et al., December 1993; Highsmith et al., October 1993; Houghton, Lees, and Driskall, 1993). This discussion focuses on the organisms and habitats that are the least likely to have recovered.

Fucus

This algae, or rockweed, is an important component of the upper intertidal zone because it provides food for many invertebrates, as well as shelter from predation and desiccation for many plants and animals (Highsmith et al., October 1993). The oil spill and subsequent cleanup destroyed many of the plants in the upper meter and reduced the reproductive capacity of the adult plants that survived (Highsmith et al., October 1993). These injuries were documented in all regions of the spill area but were highly variable between tidal elevations (MVD) and habitats (Highsmith et al., December 1993).

The Herring Bay Experimental and Monitoring study (Highsmith et al., October 1993) provided information on the recovery of plants and invertebrates in the intertidal zone.

E
EIS

TO: Rod Kuhn, EIS Project Manager

FROM: Veronica Gilbert, ADNR/EVRO

SUBJ: Interagency Review of Preliminary DEIS on Draft Restoration Plan

DATE: May 17, 1994

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p. 1-15, ¶ 2 Last sentence, "...the Plan for State Lands ~~Forest Plan~~..."

p. 2-4, ¶ 5 The description of ADNR's normal agency responsibilities should include reference to the ADNR's responsibility for archaeological resources. Suggested sentence: "Through the State Office of History and Archaeology, ADNR is responsible for protection of archaeological resources statewide."

p. 2-5, ¶ 3 The following statement is incorrect and misleading:

> The specific parcels of land assumed to be most critical to the injured resources and the services they provide are the 863,100 acres considered in the Comprehensive Habitat Protection Process; Large Parcel Evaluation and Ranking Volumes I and II (EVOS Restoration Team, 1993).

The analysis did **not** determine which habitat is most critical for injured resources and services. Rather, the parcels selected for evaluation were drawn from a larger list of nominations from landowners who expressed interest in having their land considered. They were also limited to parcels greater than 1,000 acres. The pool of "candidate lands" will change as more landowners express interest in having their land considered. Only 32 of the 90 landowners in the spill area responded to the first request for expressions of interest in 1993. Since then, more landowners have expressed interest.

We recommend ¶ 3 be rewritten to read:

> The analysis of the impact of habitat protection is based on the 863,100 acres considered in the Comprehensive Habitat Protection Process; Large Parcel Evaluation and Ranking Volumes I and II (EVOS Restoration Team, 1993). These parcels are shown in Figures 2-1 through 2-3. Appendix A, Table A-1 shows the specific benefits associated with protecting each of these parcels.
>
> The parcels evaluated in the large parcel process were drawn from parcels nominated by landowners and were limited to parcels greater than 1,000 acres. The pool of candidate lands will change as more landowners express interest in having their land considered and as smaller parcels are considered. However, the large parcels evaluated and ranked in 1993 are assumed to be indicative of the benefit that may result from habitat protection.

p. 2-7, ¶ 3 The following statement is also incorrect and misleading:

> In this alternative, it is assumed that funds are sufficient to protect all of the parcels shown in Figures 2-1 through 2-3 if land or easement prices are low.

The assumptions expressed in the Summary of Alternatives resulted from considerable deliberation by the Restoration Team. I have reproduced the pertinent passage and recommend that it be used in its entirety.

▼ Habitat Protection on Private Lands: *How Much Land Could Be Protected?*

The alternatives indicate that 91% to 35% of the remaining settlement funds could be available for acquiring and protecting habitat. The Trustee Council is looking at many methods of protecting habitat. Some of the factors that would influence the actual amount of habitat protected include:

- **land costs, which are highly variable; and**
- **whether full or partial property rights are acquired.**

Under any alternative, the amount of available land exceeds available funding. Therefore, land parcels must be ranked according to their value in restoring injured resources and services. Acquiring fee title is the most expensive way of protecting private land. Assuming acquisition of fee title and a mix of land costs, approximately 275,000 acres of land could be protected under Alternative 2. This is equivalent to about 14% of the private land within the spill area. Under Alternative 5, this figure drops to 100,000 acres, or approximately 5% of the private land within the spill area. These acreage estimates could be even lower if a larger proportion of high-value land were acquired. The estimates could be higher, if the mix of land acquired included more low cost land or partial property rights.

The last sentence of this passage acknowledges that the acreage that could be protected under Alternative 2 could be higher than the estimated 275,000 acres "if the mix of land acquired included more low cost land or partial property rights." However, it is unlikely that it could increase 863,100, as stated in the draft EIS.

pp. 2-7, ¶ 4; 2-9, ¶ 5; and 2-11, ¶ 4 On these pages, the assumptions for General Restoration are lists of potential projects by resource with no explanation of **why** you assume these projects would be considered. Particularly baffling were the following statements on p. 4-97, ¶ 2: "This alternative includes establishing a clam mariculture program to help the recovery of subsistence uses in the spill area..." While we do not necessarily dispute that this project may be considered, we are left wondering why it is considered in Alternative 5, but not the other alternatives. Subsistence is addressed in Alternatives 2-5. A sentence or two on p. 2-11, ¶ 5 explaining why this project is included as an assumption under Alternative 5 would help the reader understand the potential impact of proposed action.

p. 2-11, ¶ 4 "Typical Actions Assumed Under Alternative 5" for General Restoration should also contain a paragraph stating that projects would be allowed under this alternative to the extent they do not adversely affect the environment. This applies to all restoration actions, including enhancement. Also, under this alternative, the Trustee Council would consider whether a restoration action for an injured service is compatible with the character and public uses of the area. These are both important caveats that deserve reiteration. The proposed actions purposely did not stipulate an standard of effectiveness for General Restoration projects.

p. A-10, Table A-1 We would prefer not to see this table at all because it implies greater precision than is warranted by the gross nature of the estimates of habitat that could be protected under the alternatives. However, if this table remains in the draft EIS, we recommend that the maximum acreage be reduced to 100,000 to 275,000 and the box that now reads, "Range depends on estimated funds" read "Range depends on land costs and whether full or partial property rights are acquired."

Thank you.

cc: Marty Rutherford, Deputy Commissioner
Alaska Department of Natural Resources

Craig Tillery, Assistant Attorney General
Alaska Department of Law

E
EIS

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
Alaska Outer Continental Shelf Region
949 E. 36th Avenue, Room 603
Anchorage, Alaska 99508-4302

IN REPLY REFER TO:

MAY 1 3 1994

Mr. Rod Kuhn, Environmental Impact
Statement Project Manager
Restoration Office
Exxon Valdez Oil Spill Trustee Council
645 G Street, Suite 401
Anchorage, Alaska 99501-3451

Dear Mr. Kuhn:

We appreciate the opportunity to review the preliminary draft of the Environmental Impact Statement (EIS) for the *Exxon Valdez* Oil Spill (EVOS) Restoration Plan, which analyzes the environmental effects of proposed uses for the remaining EVOS restoration funds. We have reviewed the document primarily from a procedural perspective, reflecting our experience with the preparation of many National Environmental Policy Act documents on the environmental and sociocultural effects of oil spills.

Overall, the EIS appears carefully written and edited. For example, the EIS includes reasonable alternatives and expenditures to the proposed action--Comprehensive Restoration. It appropriately emphasizes the environmental consequences rather than descriptions of the environment. The assessments of the oil spill effects, including the estimates of persistence, seem reasonable; and most of the effects conclusions are at least partially quantified and clearly stated. Also, the EIS includes a reasonable list of other projects that would add to the cumulative effects.

The following are some minor suggestions for improvement. The summaries of the five alternatives in Chapter 2 list some typical uses of the restoration funds for Habitat Protection and Acquisition (pp. 2-7 to 2-11). However, the summaries list neither typical Monitoring and Research projects nor typical Administration and Public Information projects on which restoration funds might be spent. Some examples should be included, especially for alternatives that emphasize the category (e.g., under Alternative 5, the proposed alternative, 20 to 25 percent of the funds would be spent on Monitoring and Research). Further, the examples should include some research projects that have been funded with EVOS funds and that have been useful for damage assessments. The document inadvertently creates the opposite impression--that the research has not been relevant to the assessment and restoration of damages--because the EIS does not clearly identify the EVOS-funded research citations.

Also, we suggest that you recheck the correspondence between the summary comparison of impacts for the alternatives (Table 2-3) and the effects conclusions for each alternative and biological resource. An example of an apparent disparity is that the summary table lists nothing under anticipated impacts on harbor seals for Alternative 1, and a footnote indicates the

impacts actually may be beneficial. However, the corresponding conclusion about harbor seal populations in the text (p. 4-14) states:

> At this time, there is too little information available to predict when the populations within the EVOS area will recover. Recovery is unknown for all regions of the spill area.

We look forward to the opportunity to review in greater detail the draft EIS when it is published. The environmental scientists on my staff presently are working on an EIS for an oil and gas lease sale and have not had an opportunity, within the short timeframe for response to this preliminary draft, to carefully check the technical information in the assessments about oil spill effects.

Sincerely,

Robert J. Brock
Acting Regional Director

cc: Regional Environmental
Officer - Alaska
Office of Environmental
Policy and Compliance
Office of the Secretary
1689 C Street, Room 119
Anchorage, Alaska 99501-5126

E
EIS

United States Department of the Interior
Office of the Secretary
1689 C Street, Suite 100
Anchorage, Alaska 99501-5151

Special Assistant to the Secretary
Alaska Field Office

To: Rod Kuhn **Date:** 5/13/94

Pages: 2
(including cover)

_____
Telephone

EVOS
Dept., Bureau, Division

Anch, AK
City & State

276-7178
Telecopy number

From: Deborah Williams

Message: _____

This message is electronically transmitted on a Xerox 3010

Telefax number: 907 271-4102
Verification: 907 271-5485

United States Department of the Interior

OFFICE OF THE SECRETARY
1689 C Street, Suite 100
Anchorage, Alaska 99501-5151

May 13, 1994

Memorandum

To: Rod Kuhn
EVOS EIS Project Manager

From: Deborah L. Williams
Special Assistant to the Secretary

Subject: Review of Preliminary Draft Environmental Impact Statement for the Exxon Valdez Oil Spill Restoration Plan

The Department of the Interior believes that no less than $300 million of the remaining funds should be devoted to habitat acquisition, as part of a balanced, comprehensive restoration package. In fact, public comment solicited one year ago indicated that significantly more that 50% of the remaining funds should be spent on habitat acquisition and protection. Therefore, the Department requests that Alternative 5 be adjusted accordingly.

Thank you.

DRAFT

E
EIS

TO: Rod Kuhn, EIS Project Manager

FROM: Veronica Gilbert, ADNR/EVRO

SUBJ: Interagency Review of Preliminary DEIS on Draft Restoration Plan

DATE: May 13, 1994

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p. 1 - 15 ¶ 2 Last sentence, "...the Plan for State Lands ~~Forest Plan~~..." Rod

p. 2 - 5 ¶ 3 I understand that the EIS is being reviewed by members of HPWG and they would be the most appropriate people to address the accuracy of passages referring to habitat protection. However, this passage illustrates a general weakness in the EIS. You assert your assumption that the large parcels that were evaluated by HPWG were "the most critical to the injured resources" without stating clearly your reason for making this assumption. I suspect the reason is that you believe large parcels offer the potential for protecting intact ecological units, but if that is the reason it would be good to say so. I think it would also be useful to occasionally remind the reader that the assumption about large parcels is for analysis only and that the Trustee Council may ultimately decide to protect a mix of large and small parcels. Rod

p. 2 - 4 ¶ 5 The description of ADNR's normal agency responsibilities should include reference to the ADNR's responsibility for archaeological resources. Suggested sentence: "Through the State Office of History and Archaeology, ADNR is responsible for protection of archaeological resources statewide." Rod

p. 2 - 11 ¶ 3 "Typical Actions Assumed Under Alternative 5" for General Restoration should contain a paragraph that states that projects would be allowed under this alternative to the extent they do not adversely affect the environment. This applies to all restoration actions, including enhancement. Also, under this alternative, the Trustee Council would consider whether a restoration action for an injured service is compatible with the character and public uses of the area. These are both important caveats that deserve reiteration. Alternative 5 does not state that all restoration options that offer significant improvement over natural recovery are allowable; it purposely did not stipulate an effectiveness standard. Rod

cc: Marty Rutherford, ADNR
Craig Tillery, Department of Law

E/EIS

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Regional Office
2525 Gambell Street, Room 107
Anchorage, Alaska 99503-2892
Division of Environmental Quality

IN REPLY REFER TO:

TAKE PRIDE IN AMERICA

FAX COVER SHEET

DATE: 13 MAY 1994

TO: Rod Kuhn, EIS Project Manager, EVOS Restoration office

FAX #: 276-7178

FROM: BUD RICE

SUBJECT: Comments on Preliminary Draft EIS for Exxon Valdez Oil Spill Restoration Plan

NUMBER OF PAGES TO FOLLOW: 9

REMARKS: Please call us if you have questions about any of the comments. Thank you for the opportunity to participate. This is a monumental task! Good luck and stay with it.

Bud Rice

FOR PROBLEMS, CALL (907)257-2647

RETURN FAX NUMBER: (907)257-2517

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Regional Office
2525 Gambell Street, Room 107
Anchorage, Alaska 99503-2892

IN REPLY REFER TO:

L7619(ARO-REQ)

May 13, 1994

Rod Kuhn, EIS Project Manager
Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401
Anchorage, AK 99501-3451

Dear Mr. Kuhn:

Thank you for the opportunity to comment on the Preliminary Draft Environmental Impact Statement (PDEIS) on the Exxon Valdez Oil Spill Restoration Plan. We believe that the document is generally in good shape and contains most of the elements needed in a sufficient EIS. Our comments on the PDEIS are attached in the memorandum to Paul Gates of the Department of the Interior Office of Environmental Policy and Compliance. If you have any questions about these comments, please feel free to contact me at 257-2648 or Bud Rice at 257-2466.

Joan B. Darnell

Attachment

cc:
Paul Gates, DOI/OEPC

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Regional Office
2525 Gambell Street, Room 107
Anchorage, Alaska 99503-2892

IN REPLY REFER TO:

TAKE PRIDE IN AMERICA

L7619(ARO-REQ)

MAY 13 1994

Memorandum

To: Regional Environmental Officer, DOI/OEPC

From: Chief, Division of Environmental Quality, Alaska Region

Subject: Review of Preliminary Draft Environmental Impact Statement (PDEIS) for the Exxon Valdez Oil Spill (EVOS) Restoration Plan

Thank you for the opportunity to review the subject document. Overall the document seems to be well-written and represents a massive effort to capture information and analyses to date regarding restoration of the Exxon Valdez Oil Spill. We believe there are a number of improvements or corrections which could be made to improve the accuracy and quality of the document. We break our comments into two basic categories: general comments and specific comments.

General Comments

We notice that several pieces of the document are missing or incomplete that we will not have an opportunity to review before the document goes out to the public. Examples of these are: an abstract or summary, table of contents for the entire document, index, and a list of references cited. This points to perhaps our biggest concern, and that is for the hurried manner in which such a large and important programmatic EIS is being produced. We realize, however, that several years have passed during which public meetings and restoration activities have already taken place, and that the time is overdue for an EIS on the subject. We support efforts to carry forward the National Environmental Policy Act (NEPA) process without unnecessary delay.

In chapters one and two the document omits reference to general management plans (GMPs) and land protection plans (LLPs) for National Park Service units throughout the spill affected area. The document generally appears to ignore the affects of EVOS to damaged resources in national parks except under the topic recreation/tourism. The document under-emphasizes impacts to damaged resources outside Prince William Sound (PWS) with the possible exception of Afognak and Kodiak Islands.

The document appears to have inconsistencies in the evaluation of

consequences of the alternatives. Not only are some impact topics discussed in considerably more detail that others, but also the analysis of the same impact topics for different alternatives differs in length and quality. We recognize that it may be more appropriate to give more detail on the preferred alternative.

Since previous public comment strongly supported the establishment of a "restoration reserve account" for future restoration projects and habitat acquisition, we feel that making that option available only in alternative five is inadequate. This sets alternative 5 clearly apart from all the other alternatives and makes it by far the most palatable option to many reviewers based on that aspect alone. It is the only alternative that provides hope and promise for additional future needs in the restoration process.

There is duplication of tables and evaluation criteria throughout the document. An example is Table 2-4 and Table 4-2 are exactly the same. In the interest of reducing the use of paper and addressing the Paper Reduction Act and CEQ regulations, we recommend the use of cross-referencing where possible.

The 45-day comment period for such a large and controversial programmatic EIS seems far too short. We believe that a 60 or 90-day period would be more appropriate.

We believe that map figures somewhere in the document should identify the locations of designated and proposed Wilderness. The analysis of possible environmental consequences to Wilderness resources is otherwise extremely difficult for the reviewer, particularly where habitat acquisition may occur. Wilderness areas could be shown on figures 2-1 to 2-3 or preferably in chapter 3.

Specific Comments

Pg 1-1, Par 1: Define the "Trustee Council". Though defined later in this chapter, it seems that this group should initially be called the **Exxon Valdez Oil Spill Trustee Council.**

Pg 1-3, Last Par, Decision to be Made: It seems that the final decision called the "Record of Decision (ROD)" could be stated here. The last paragraph in chapter 4, page 148, could be moved to here.

Pg 1-4, Par 1: The spill trajectory and extent was recorded by aerial observation in addition to satellite imagery. Satellite coverage was incomplete at best due to periods of cloud cover. Figure 1-1 needs insets to show locations of islands named at the top of page 1-5.

Pg 1-13, Table 1-2: Listing Archeological Resources and Designated Wilderness Areas under other resources is inconsistent

with the proposed restoration plan.

Pg 1-14, Possible Conflicts Between the Proposed Action and Other Plans: This section and the subsequent findings omit plans from areas managed by the Department of Interior that represent a significant portion of the spill affected area. We suggest that you add the following National Park Service (NPS) documents to the list of programs and plans reviewed:

- Kenai Fjords National Park General Management Plan (1984)
- Katmai National Park and Preserve General Management Plan/Wilderness Suitability/Land Protection Plan (1986)
- Kenai Fjords Land Protection Plan (1988 as amended 1992)
- Kenai Fjords Wilderness Recommendations FEIS (1988)
- Katmai National Park and Preserve Wilderness Recommendations FEIS (1988)

Similar documents should be listed for areas managed by the U.S. Fish and Wildlife Service.

Pg 1-15, Findings: We recommend adding the following subheading and text in this section:

> National Park System Plans. The National Park Service has reviewed the relationship between the proposed action and the General Management Plans (GMPs) and Land Protection Plans (LPPs) for Kenai Fjords National Park and Katmai National Park and Preserve, and we reached the following conclusions:
>
> * Habitat protection and acquisition are compatible and consistent with the GMPs and LPPs for Kenai Fjords National Park and Katmai National Park and Preserve.
>
> * Acquisition of high value habitats and inholdings within Kenai Fjords National Park and Katmai National Park and Preserve is supported by the GMPs and LPPs.
>
> * The National Park Service is not aware of any conflicts between the Draft Restoration Plan and the Park GMPs and LPPs.

Pg 1-18, Regional Comprehensive Salmon Enhancement Plans: We recommend the information discussing NPS management plans in relation to the Restoration Plan be deleted from under this subheading. See above comment.

Pg 2-3 to 2-5, Alternative 1: The National Park Service (NPS) is not mentioned in this alternative, yet it is one of the major land managers in the EVOS-affected area. Consider inserting the statement below to be consistent with the treatment of other primary land managers in the EVOS area:

The National Park Service (NPS) manages the national park system

and the National Historic Register to accomplish the following purposes:

- To conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

- To provide the opportunity for continued subsistence uses by local residents.

- To document and protect nationally significant archeological and historic resources.

Figure 2-3: None of the land status figures show the Alaska Peninsula and small parcels that may need protection. In particular, small parcels of private land along the coast of Katmai NP&P with significant cultural resources are at risk from development and long-term impacts.

Pg 2-11, Assumptions Used for Impact Assessment: The funding amounts for Monitoring and Research seem proportionally high. We suggest that amount could be reduced with the balance diverted to Habitat Protection and the Restoration Reserve.

Pg 2-12, Birds: Why is predatory control identified for only 15 islands when 16 islands are indicated in all of the other alternatives?

Table 2-1, Issue 2: We recommend replacing the phrase "...ecosystem management and the consideration of non-target species" with **ecosystem functioning and non-target species.** Also, for alternatives 3-5 restoration project activities may also enhance ecosystem functioning and non-target species. For example, cleaning of mussel beds would benefit river otter, mink, wolverine, goldeneyes, bears and any other non-target species that may forage on that resource.

Table 2-1, Issue 5: We recommend replacing the phrase "Protection would protect" with **Protection would preserve opportunities for.** Habitat protection alone will not protect subsistence uses; applicable federal and state laws and regulations also have considerable effect.

Pg 2-17, Table 2-3: The use of beneficial impacts is confusing as applied to some impact topics. For example, why would the beneficial impact to harbor seals be lower for alternative 2 where more habitat would be acquired and human activities are likely to be kept at a lower level than for the other action alternatives? The same confusion occurs for subsistence and wilderness, why would there be more beneficial impacts to subsistence and wilderness for alternatives that are likely to result in less habitat protection than alternative 2? It seems that these judgements could be reversed. Conversely, it seems

that impacts to economy (forestry) would be greater with alternative 2 than with alternatives that are likely to result in protection of less habitat area.

Pg 2-19, Table 2-4, Subsistence: The following phrase is very awkward, "increase in confidence levels that subsistence users in affected communities have of contamination in subsistence foods". We suggest replacing the phrase with **increase in confidence by subsistence users that subsistence foods lack contamination.**

Pg 2-20, Table 2-4, Recreation and Tourism: The proper way to analyze and manage recreation is with change in recreational setting or environment. Restoration projects affect the recreational setting which in turn influence the quality of a visitor's experience, but other personal factors also affect a visitor's experience that may have nothing to do with the setting or restoration activities. We suggest that under the column for negligible that the phrase "on the quality of their experience" be replaced with **in the quality of recreational settings.** Similarly, for all the other impact levels, we suggest replacing "recreation quality" with **recreational settings.**

Pg 2-20, Table 2-4, Wilderness: The definitions of beneficial impacts to wilderness omit consideration of opportunities for solitude and primitive, unconfined recreation.

Pg 3-28, Kenai Peninsula Borough, Last Par: Seward is accessible by the Seward Highway. Technically the Seward Highway runs from Anchorage to Seward, and the Sterling Highway begins at the "Y". We recommend inserting **Seward Highway** before "Sterling Highway.

Pg 3-40 & 41, Recreation: We feel that this discussion should highlight and emphasize those federal and state recreation areas that were affected by EVOS. The large important areas that were impacted by EVOS were Chugach National Forest, Kenai Fjords National Park, Alaska Maritime National Wildlife Refuge, Kachemak Bay State Park, Kodiak National Wildlife Refuge, Shuyak Island State Park, Katmai National Park and Preserve, and McNeil River State Wildlife Refuge. We question why Chugach State Park is listed as being in the spill-affected environment. Consider deleting reference to it unless indirect impacts to the park can be documented as a result of EVOS. Captain Cook State Recreation Area was not in the EVOS area, but other state parks and state marine parks such as Caines Head State Recreation Area, Anchor Point and Clam Gulch were in the EVOS-affected area.

Pg 3-41, Recreation, Par 1: The Kenai Fjords area is also known for northern (Steller) sea lions, harbor seals, seabirds, mountain goats, black bear, river otter, and bald eagles. We suggest this list since long lists of wildlife are given for national wildlife refuges in this section.

Pg 3-41, Recreation, Par 5: The mountain goat population is not large and was introduced to Kodiak Island. If they are mentioned

here, then they must be mentioned also for Chugach NF and Kenai Fjords NP. Where is rafting in Kodiak Wildlife Refuge? The remote Karluk River now belongs to a local Native corporation that does not always encourage rafting there.

Pg 3-42, Recreation, Par 2: Katmai National Park and Preserve is famed for having the world's largest protected population of brown bears. It is also famous for its volcanoes and the 1912 eruption that formed the Valley of Ten Thousand Smokes.

Pg 3-42, Recreation, Par 6: The Alaska Maritime National Wildlife Refuge also contains many very large sea lion rookeries and haulouts. The Chiswell Islands are closer to Kenai Fjords National Park than Seward and Resurrection Bay.

Pg 3-43, Commercial Recreation (tourism), Par 3: Kenai Fjords National Monument should be changed to **Kenai Fjords National Park**.

Pg 3-44, Wilderness, Par 2: We recommend changing the phrase "Areas formally designated as wilderness" to **Areas with formal Wilderness designation**, because not all of these areas is are entirely classified as wilderness. Also, Lake Clark National Park and Preserve already has some area designated as wilderness. Additional wilderness area is being considered for formal designation, as with Katmai National Park and Preserve.

Pg 4-32, Pigeon Guillemots, Habitat Protection: It is not true that little is known about the status of Pigeon Guillemots outside of Prince William Sound. Numerous seabird surveys along the southeast side of the Kenai Peninsula before and after EVOS indicate that substantial pigeon guillemot populations have decreased since EVOS. Pigeon guillemot colonies are generally small and dispersed. We recommend that this statement be amended appropriately for this and all other alternatives under the subheading for pigeon guillemots.

Pg 4-33: We notice that the conclusions for beneficial impacts to fish resources are presented in a different style than for birds or other resources; for example short-term and long-term effects are broken out and negligible and moderate are underlined. This seems to add weight to consideration of impacts to these resources. We feel that the style of conclusory statements should be consistent throughout the document.

Pg 4-37, Recreation, Par 2: There is much more to recreation than visual quality including but not limited to the sound environment (noise considerations), odors (considerations for industrial odors). We recommend deleting the word "visual" before "quality of undeveloped landscape ..." and enlarge the discussion to include all facets of quality recreational settings. The same should be done under the recreation subheading for all alternatives. In many instances the word "recreation" should be amended to be **recreational**.

Pg 4-37, Wilderness, Par 1: Why do the rankings consider wilderness character only and not Wilderness designation when in the affected environment a focus is given to designated Wilderness? It seems important to consider impacts to defacto wilderness and designated Wilderness, but extra weight should be given to formally designated Wilderness and Wilderness study areas because we are directed by law to protect these areas. Also, the conclusion is stated with Wilderness in capital letters which generally connotes designated wilderness.

Pg 4-38, Commercial Fishing: The short-term conclusion seems illogical if the habitat is slated for immediate logging. Low beneficial benefits would seem more accurate.

Pg 4-39, Sport Fishing: Similar comment to the above. Low benefits in the short-term seems more accurate than negligible.

Pg 4-40, Economy: The IMPLAN projections seems to under-represent economic impacts to commercial fishing and recreation/tourism because of lack of quantifiable data for these economic sectors. We feel that measuring only the indirect effects of other sectors of the economy to estimate economic impacts to commercial fishing and recreation is a potential serious short-coming.

Pg 4-52, Sockeye Salmon: Why are pink salmon discussed under this section? It appears to be a typographical error. Note that the same occurs under other alternatives where sockeye salmon are discussed.

Pg 4-89, -Removing Residual Oil: This paragraph appears to be out of place. It discusses environmental consequences to subsistence, not recreation and tourism. It probably belongs in the previous section on subsistence.

Pg 4-89, Recreation, Conclusions: The use of the term "experiences" could probably be replaced with **settings**. We recommend that the last two lines be rewritten as **benefits would be offset by changes in the quality of the wilderness setting (loss of opportunities for solitude, noise) as use increases.**

Pg 4-89, Wilderness, Habitat Protection: In this section benefits to designated Wilderness are discussed, and the emphasis on wilderness character is omitted. This seems inconsistent with the presentation on page 4-37 for alternative 3.

Pg 4-106, Murres, Predator Control: The paragraph regarding Otter Island should be deleted from this programmatic EIS. It seems inappropriate for an inexpensive project outside of the EVOS area to be funded by EVOS settlement funds. We question why this project is not carried out with normal FWS operating funds if it is that important. Also, ten thousand murres is a small number relative to the millions that live in the Bering Sea area.

Pg 4-106, Murres, Conclusions: We recommend deleting reference to the Otter Island project in this programmatic EIS.

Pg 4-107, Pigeon Guillemot, Predator Control: As with the comments above for murres, we question whether the predator control program in the Aleutians is consistent with the guidelines and description of alternative 5 in chapter 2.

Pg 4-109, Comprehensive Restoration Actions: Dates are missing for publications, and the sentence at the end of paragraph 3 in this section is incomplete.

Pg 4-112, Sockeye Salmon, Habitat Protection: We question why the benefit to sockeye salmon would be low if all habitat parcels are protected, but the benefit would be slightly greater, low to moderate, if only 31 to 34 parcels are purchased. These statements defy logic.

Pg 4-140, Wilderness: Where is the discussion on beneficial impacts to wilderness? Were the authors exhausted by this point? The conclusion does not seem logical. Would not increased access from some of the proposed developments have a very serious cumulative effect to wilderness resulting in increased degradation of opportunities for solitude and primitive, unconfined recreation?

Pg 6-7: The first row of community names in the list are printed in larger format than all of the other names. They should all be the same.

Table A-1: What is the significance of the order of parcels given? Are they in priority order by score of some sort? We recommend providing summary scores for each parcel to help the reader understand how close some of the relative rankings may be.

The Herring Bay Experimental and Monitoring study (Highsmith et al., October 1993) provided information on the recovery of plants and invertebrates in the intertidal zone. Recovery in the upper intertidal appears to depend on the return of adult *Fucus* in large numbers to this zone. In the absence of a well-developed canopy of adult plants, eggs and developing propagules of *Fucus* lack sufficient moisture and shelter to survive. Existing adult plants act as centers for the expansion of the community. *Fucus* plants in the sample sites were estimated to take 3-4 years to become fully mature. Because eggs generally settle within 0.5m of the parent plant, the Herring Bay study estimated that *Fucus* communities are able to expand at a rate of 0.5m every 3-4 years (Highsmith et al., October 1993). It is unknown how these results would vary in areas outside of Herring Bay where habitat conditions differ.

Limpets, Barnacles and Other Invertebrates

The recovery of limpets, barnacles and other invertebrates is also linked to the recovery of rockweed. Because there were no baseline data for intertidal communities, the exact composition of the community structure is unknown. Full recovery, based on the community structure of comparable nonoiled sites, of the intertidal community may take more than a decade, since it may take several years for some invertebrate species to return after *Fucus* has recolonized an area.

Mussels

The oil spill injured mussels throughout the EVOS area. Coastal habitat studies documented changes in the presence of large mussels and in total biomass of mussel communities between oiled and nonoiled areas (Highsmith et al., October 1993, and Highsmith et al., December 1993). Oil was found in the sediments beneath mussels (Rounds et al, 1993) and hydrocarbons were identified in mussel tissues (Babcock et al., 1993). Mussels can be found in loose aggregations attached to intertidal rocks, or they can be found in dense aggregations (mussel beds) over pea gravel and silt sediments. Because mussels form a dense matt over the sediments and rocks, oil that was trapped beneath the mussels was not exposed to weathering and still remains toxic. Feasibility studies to develop techniques to clean the sediments beneath mussel beds are underway in the EVOS area. The results of these studies are still preliminary but suggest it may be possible to clean the mussel beds without destroying the community.

In this alternative, no further attempts would be made to clean mussel beds. It is not known how long the trapped oil will remain volatile. Because mussels are an important prey species for many other organisms; including sea otters, harlequin ducks and black oystercatchers that were injured by the spill, it is possible that the trap oil will be a continuing source of contamination to the coastal ecosystem in the EVOS area. The consequences of this source of contamination is unknown; however, mussel beds are known to be one of several locations where Exxon Valdez oil may still be transmitted into the environment. For instance, oil is also trapped beneath mussel aggregations that are not classified as "mussel beds" and no techniques have been proposed to clean these areas without killing the mussels.

Clams

Marginal declines in clam populations were noted in 1989. Native littleneck and butter clams were impacted by both oiling and cleanup, particularly high-pressure, hot-water washing. Littleneck clams transplanted to oiled areas in 1990 grew significantly less than

those transplanted to nonoiled sites. Reduced growth rates were recorded at oiled sites in 1989, but not in 1991 (EVOS Trustee Council, November 1993), suggesting that the effects of the spill on growth rates were diminishing. Is has been suggested that the availability of substrates suitable for clams were reduced as a consequence of cleanup activities (EVOS Trustee Council, December 1993).

The magnitude of measured differences in the abundance of clams varied with the degree of oiling and geographic area. On sheltered beaches, the data on abundance of clams in the lower intertidal zone suggest that littleneck clams and, to a lesser extent, butter clams were significantly affected by the spill (EVOS Trustee Council, November 1993). During the 1993 public meetings, people throughout the oil-spill area, but especially in Kodiak and Alaska Peninsula communities, said they are still finding clam beds that are contaminated with oil (EVOS Trustee Council, August 1993). Clams are an important resource for subsistence and recreational use within the oil spill area, and they are preyed upon by a wide variety of other resources.

Conclusions for the Intertidal Zone

With the exception of certain habitats and specific organisms, the intertidal zone has largely recovered from the effects of EVOS. *Fucus* and the organisms associated with the rockweed have still not recovered in the upper intertidal zone. With no intervention, it may take over a decade before the algal based communities resemble the prespill condition. The oil that is trapped beneath mussels is likely to remain unweathered for many years. The consequences of the presence of these sources of relatively fresh oil is unknown, but may have negative impacts on other organisms which rely on mussels for prey.

Impact on Marine Mammals

Harbor Seals

Harbor seals are protected from commercial harvesting, harassment and indiscriminate killing by the Marine Mammal Protection Act of 1972 (MMPA). Traditional subsistence harvest by Alaska Natives is exempted from the MMPA. The MMPA also allows for some loss from incidental take by commercial fishermen.

Harbor seal populations have responded to the protection which outlawed indiscriminate killing and commercial harvesting by increasing in many parts of their range (Harvey et al., 1990). Documented rates of increase have been as high as 22 percent per year (5-22% range) (Stewart et al. 1988; Harvey, Brown and Mate. 1990; Olesiuk, Bigg and Ellis. 1990). Most of these increases have been from populations that were exploited prior to the MMPA and show a response to reduced mortality. There have been no long term studies to document changes to harbor seal populations as a result of oil spills (Stewart, Yochem and Jehl, 1992), or from other habitat perturbations.

In contrast to harbor seal populations in other areas, seals in the central and western regions of the Gulf of Alaska have been declining since the mid-1970's (Pitcher, 1990). Population trend indices, based on counts at haulout sites, have shown a drastic decline (about 85%) in the population near Tugidak Island, in the Kodiak Archipelago. Similar declines, approximately 11 percent per year since 1984, were documented in PWS prior to the oil

spill. Why these populations show decreases when other populations are increasing puzzles scientists and complicates understanding the effects and potential recovery from the Exxon Valdez oil spill.

Subsistence harvest and interactions with commercial fisheries (eg. entanglement and drowning in gear, or through being shot to protect catch) may be contributing to the decline, but are not thought to be the cause (Pitcher 1990, Frost and Lowry 1993). Records of subsistence harvest at Tatitlek and Chenega Bay, the two largest seal harvesting communities in PWS, have been gathered only intermittently, but from April 1990 to March 1991, 133 seals were harvested (ADF&G Division of Subsistence, unpublished data). This represents approximately 5 percent of the population counted during molting surveys (Loughlin 1992 in Frost and Lowry 1993). Although this level of harvest is unlikely to cause the decline in seal numbers, any additional mortality may slow recovery.

Interactions between harbor seals and commercial fisheries also may affect the recovery of the seal population. Seals can become entangled and drown in lost gear, or they may become injured or killed as fishermen attempt to protect their catch and nets. In 1990 and 1991 a marine mammal observer program documented interactions between the PWS salmon driftnet fishery and harbor seals. The results showed that although encounters were frequent, the number of harbor seals injured or killed were low (Wynne, Hicks and Munro, 1992). Because this study focused on only one of the fisheries operating in the Sound, and because the sample size of documented injuries and death were very small, it is impossible to predict total interactions between seals and the commercial fisheries in PWS. However, the study does indicate that interactions with commercial fisheries within PWS is unlikely to be the cause of the long term decline in the local seal population.

Disturbance has been documented as adversely affecting harbor seals and other pinnipeds in other parts of their range (Allen, et al. 1984; Esipenko, 1986; Johnson, et al. 1989). These studies have shown that the greatest impacts from disturbances are at haulout sites during pupping and molting. During pupping, disturbance can result in higher pup mortality caused by abandonment, or from being crushed as the adults panic and return to the water (Johnson, 1977). The greatest disturbance is caused when people walk near or through haulout sites (Johnson, et al. 1989), but disturbance can also be caused by low flying aircraft and by boats that approach too close to the haulouts. Within the EVOS area, there have been no studies to document the amount or effects of disturbance. Without these data, it is impossible to determine if current activities, or activities likely to occur in the future, will hamper the recovery of the population. However, it is reasonable to assume that increasing disturbance at haulouts used for pupping and molting could cause additional stress and mortality.

The Exxon Valdez oil spill killed an estimated 300 harbor seals from the PWS population. Recent population trend counts indicate that the population may be stabilizing from the long term decline (Frost et al., in press); however, until the population begins to increase it will be impossible to predict how long it will take the population to recover. In PWS, there are at least three possible ways to define recovery for the local harbor seal populations.

- Recovery from the oil spill could occur when the population has increased by 300 individuals (to compensate for the 300 lost in the oil spill) in the oiled areas.

- Recovery could occur when the population has returned to its 1970's levels of abundance. This would show recovery not only from the spill, but also whatever was causing the long term decline.

- Recovery occurs when the trend in population is similar to those of nonoiled areas.

There are no data on injury in other regions of the oil spill area, although oiled seals were observed, and the impacts on harbor seals in these areas are unknown. However, recent trend counts near Tugidak Island give no indication that the long term decline is abating (Frost and Lowry, In press). Until research is conducted to determine what is causing the long term decline, or until monitoring shows that the populations are increasing, any estimates of recovery will be speculative.

Conclusion. At this time, there is too little information available to predict when the populations within the EVOS area will recover. Recovery is unknown for all regions of the spill area.

Sea Otters

Sea otters are expected to eventually recover to prespill numbers in all regions of the spill area. The amount of time needed before the populations have recovered from the effects of the spill will vary between regions because the level of injury differed greatly between areas. Approximately 1000 carcasses were recovered throughout the oil spill area in 1989, but the largest numbers were collected from western PWS. As the oil moved further from PWS, fewer otters apparently died from direct oiling. Because otters in PWS experienced the highest mortality, the subsequent Natural Resource Damage Assessment (NRDA) studies focused on PWS. There are no data on recovery or the current status of otters in other regions of the spill area; although surveys in 1989 could not document any population loss (Ballachey and Bodkin, pers. comm.). For the purposes of this analysis, it is assumed that the oiled portions of the PWS population represent the worse-case scenario for populations throughout the spill area.

Damage assessment studies in 1990 to 1992 indicated higher than usual mortality in prime aged animals (Monson, 1993) -- normally the age group least susceptible to mortality. It was also apparent that young sea otters just weaned from their mothers were not surviving well (Monnett and Rotterman, 1992). The causes of these continuing signs of injury are unknown; although, one hypothesis is that the otters are continuing to be exposed to oil through their prey. In 1992 and 1993 the prime aged mortality rates were close to normal (Ballachey and Bodkin, pers comm. 1994). The weanling survival rates were improving, but were still different than in the nonoiled areas of the Sound (Ballachey and Bodkin, pers comm 1994).

There are several ways to define recovery for the injured sea otter populations. For the purposes of this DEIS, sea otters will have recovered when the populations in the oiled portions of the EVOS area have returned to their prespill numbers with no unusual additional mortality. For PWS, recovery will occur when the population in the western sound has recovered the 2500 (approximately) individuals estimated to have been lost from the spill (Garrott, Eberhardt and Burn, 1993).

Once the sea otter population begins to increase in the oiled area, the rate of recovery depends on the growth rate of the injured population, and on the number of otters that move into the oiled areas from the nearby unoiled regions (immigration rate) or vice versa (emigration rate). The population growth rate for sea otters depends largely on the size of

4 Environmental Consequences

the existing population and on the condition of the habitat and the available prey. Sea otters are notorious for altering their habitat through heavy predation on certain prey species (Kvitek et al, 1989; Riedman and Estes, 1990). In the absence of otters, prey species such as sea urchins, crabs and clams ~~become plentiful again.~~ Sea otters were exterminated from much of their historic range, including most of the EVOS area, ~~from overharvesting for their fur.~~ ~~Over the last century~~ they have recolonized ~~many parts~~ of their historic range.

~~Research has shown that~~ When otters move into an area with abundant prey they can increase their population by as much as 20 percent per year (Estes, 1990). ~~For sea otter populations already established in an area like~~ PWS, it is reasonable to assume that the growth rate would be less ~~than the theoretical maximum of 20 percent.~~ For any population growth to occur, the habitat must be able to support more sea otters. None of the NRDA or restoration research studies have specifically examined the carrying capacity of the oiled areas for sea otters; however, studies of the subtidal and mid- to lower intertidal zones are encouraging and suggest that portions of these important areas are on their way towards recovering (Highsmith et al, December 1993).

The ~~immigration and emigration~~ rate of otters to and from nonoiled areas will also influence the recovery of the injured sea otter population. Because the ~~boundaries of~~ the spill area extend beyond the areas immediately oiled, there are populations of otters within the spill area that were not directly affected by the oil spill and that may help to recolonize the oiled areas. Based on information from a telemetry study of female and weanling sea otters in PWS, there were no signs of movements between oiled (western PWS) and nonoiled (eastern PWS) areas (Monnett and Rotterman, 1992). Hinchinbrook Entrance is a deep water area with strong tidal fluxes and may serve as a substantial barrier for migrating otters (Monnett and Rotterman, 1992). This analysis assumes that the patterns also apply to the movements of male otters and that the immigration rate equals the emigration rate and will, therefore, be zero.

~~Another factor that will~~ influence the rate of recovery ~~is the level of subsistence harvest.~~ Although sea otters are protected from commercial harvest and harassment under the MMPA, there is an exemption that allows for subsistence harvest by Alaska Natives. At this time, reported subsistence harvest of sea otters within the spill area is fairly low but is increasing throughout the spill area. Sea otters are not harvested for food, but some are harvested to use their fur for subsistence, crafts and artwork. In the mid-1980s a ruling broadened the interpretation of what types of products could be made from sea otter pelts, and increased the list of products that could be sold. After this ruling, sea otter harvests increased significantly. Within the oil spill area, records of reported sea otter harvests showed that before the ruling (1972 to 1987), approximately 250 otters were harvested in 14 communities ~~within the spill area.~~ Records for 1988 through 1993 show that the harvest increased to approximately 700 animals for the spill area (USFWS, unpublished data).

~~So~~ What type of ~~an~~ estimate of recovery can be made for sea otters in PWS? Current estimates of the number of sea otters that died as a result of the oil spill in the western portion of PWS range between 2000 and 3000 (Garrot, Eberhardt and Burn, 1993). ~~For purposes of illustration,~~ Assume a constant growth rate ~~that can be as high as~~ 10 percent ~~or as low as~~ 2 percent, and that the subsistence harvest remains low; then, regaining the 2500 individuals lost could take from 7 to 35 years. There are no signs that the population in the western Sound is beginning to increase; therefore, the 7 to 35 year estimates are delayed until the population shows signs of increasing. ~~These estimates assume that the subsistence harvest remains low in the affected areas.~~ If harvest rates rise substantially in the oiled areas, then

E
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Comments that I do not intend to incorporate into the final Draft EIS.

ADF&G

pg 44,69,98: "Paragraph 2. Last sentence. How many acres in these 60 locations." The information is unavailable, and the number 60 is an approximation based on surveys to date.

pg 97: "First sentence should show page numbers where this discussion on impacts may be found." Discussion is included in the preceeding paragraph. I will check it for clarity.

NMFS

Ch 4, pg 1, para. 1 ...suggest underlining the word "increases" for emphasis. This would be inconsistent with the formatting of the rest of the document where underlining is used only in headers or within the conclusion statement.

E
EIS

To: EIS Team.

I have read and reread the comment by John F. on page 10, chapter 4, attached. I am still not certain what it means, but my translation is Para 1, below. Para 2 provides an expansion and Para 3 may also be useful. I think that we need to talk about this and I am not comfortable with John's replacement statement.

The No Action Alternative is required by NEPA to provide an understanding of what may occur if no actions are implemented to restore the injured resources to pre-spill conditions.

(It is intended to be a forecast or projection of conditions from the present status of the injured resources [i.e., Draft Restoration Plan] to a future status if no actions are taken.)

It will provide additional background for analysis and comparison to forecast impacts from actions of other alternatives.

4 Environmental Consequences

or projected

provide understanding of what may occur if the proposal is not adopted. It is a forward impact projection of the existing levels of action/no-action in being at the time of the proposal.

Alternative 1 - No Action

Introduction

The No Action Alternative is required by NEPA to ~~provide a basis for comparing the impacts of the other proposed alternatives~~. In this DEIS, the No Action Alternative describes what would happen to the resources and services injured by EVOS if no restoration actions were implemented. Because none of the civil settlement funds would be spent to aid recovery, the only actions undertaken within the spill area would be the result of normal agency management or private enterprise. For biological resources, recovery from oil spill injuries would be unaided (natural recovery) and could be complicated by other human activities that could cause further injuries or habitat loss. The recovery of other resources or services also may be influenced by other nonoil spill-related actions.

Biological Resources

Impact on Intertidal Resources

The intertidal zone was especially vulnerable to injury from the EVOS and from the subsequent cleanup operations. The oil spill caused population declines and sublethal injuries to the plants and animals of the intertidal zone. Portions of 1,500 miles of coastline were oiled (350 miles were heavily oiled), resulting in significant impacts to intertidal habitats, particularly in the upper intertidal zone. Direct oiling killed many organisms, but beach cleaning, particularly high-pressure, hot-water washing, had a devastating effect on intertidal life (Houghton, Lees, and Driskall, 1993).

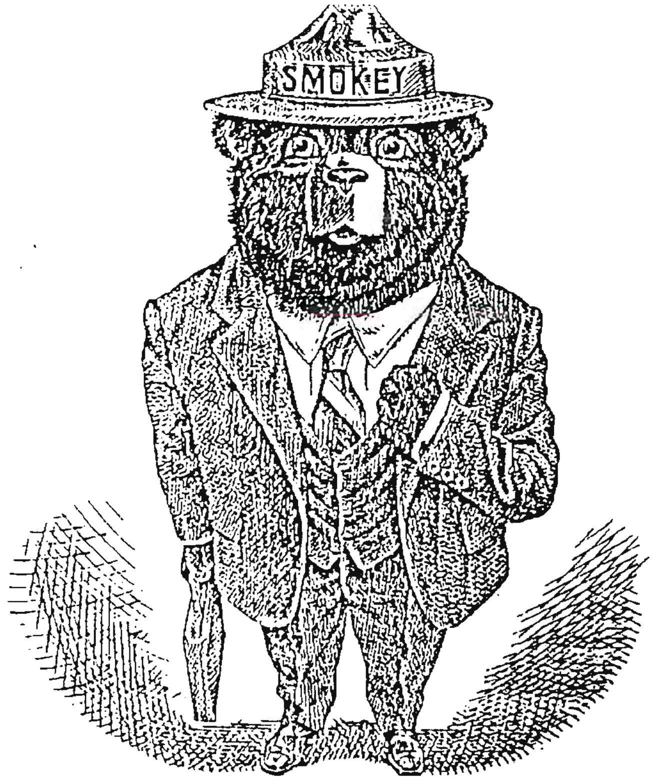
Coastal habitat studies documented changes in many species of algae, invertebrates, and fish; the injuries were highly variable between species, regions, and habitats (Highsmith et al., December 1993). For most of the intertidal zone, the effects of the oil spill were probably short term. Studies in 1992 and 1993 showed that many of the differences in habitats and organisms that were documented in 1989 and 1990 were recovered (Houghton, Lees, and Driskall, 1993; Highsmith et al., December 1993). However, some areas had not yet begun to recover or were recovering very slowly. This was especially evident in the upper 1 meter vertical drop (MVD) of sheltered rocky habitats where the algae *Fucus gardneri* is the dominant plant species (Highsmith et al., December 1993; Highsmith et al., October 1993; Houghton, Lees, and Driskall, 1993). This discussion focuses on the organisms and habitats that are the least likely to have recovered.

Fucus

This algae, or rockweed, is an important component of the upper intertidal zone because it provides food for many invertebrates, as well as shelter from predation and desiccation for many plants and animals (Highsmith et al., October 1993). The oil spill and subsequent cleanup destroyed many of the plants in the upper meter and reduced the reproductive capacity of the adult plants that survived (Highsmith et al., October 1993). These injuries were documented in all regions of the spill area but were highly variable between tidal elevations (MVD) and habitats (Highsmith et al., December 1993).

The Herring Bay Experimental and Monitoring study (Highsmith et al., October 1993) provided information on the recovery of plants and invertebrates in the intertidal zone.

C
EIS



TELECOPY COVER PAGE

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DATE: 5/20/94

TIME: 8^45

COMMENTS:

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May 20, 1994

CONFIDENTIAL ATTORNEY-CLIENT COMMUNICATION/ATTORNEY WORK PRODUCT
DO NOT RELEASE UNDER FOIA

TO: Rod Kuhn
EIS Project Manager
Oil Spill Restoration

FROM: Maria Lisowski
Attorney

SUBJECT: Comments on Draft EIS for Restoration Plan

ISSUE/SUMMARY

You have requested OGC comments regarding the Draft Environmental Impact Statement for the Draft Restoration Plan. I have previously provided page specific comments for Chapters 1 and 2 of the DEIS; page specific comments for Chapters 3 and 4 were provided by facsimile earlier this week. My general comments appear below. Because of the limited time to review the DEIS, the comments provided should not be considered a thorough review of the document. Further comments may be forthcoming during the public review and comment period for the DEIS.

DISCUSSION

1. The environmental consequences section in Chapter 4 discusses only the "short-term benefits" and "long-term benefits" of restoration activities upon resources and uses. The analysis should focus not on benefits but on the effects of the proposed activity and their significance. 40 C.F.R. § 1502.16. Effects may be beneficial and detrimental and discussion of each must be included. 40 C.F.R. § 1508.8. Thus, for example, the potential detrimental effects on wild stocks of fish resulting from the introduction of hatchery reared fish cannot be ignored in the discussion of the environmental consequences of undertaking that proposed restoration activity.

2. Throughout the document the discussion regarding the restoration of services is muddled, frequently implying that direct restoration of reduced services may occur. As noted in the Draft Restoration Plan, projects designed to restore or enhance reduced services must have a sufficient relationship to an injured natural resource, must benefit the same user group that was injured, and should be compatible with the character and public uses of the area. Draft Restoration Plan, p. 14. The discussion regarding the effects of restoration activities upon services

should more clearly link the restoration activity to an injured natural resource and dispel this presupposition that reduced services can be restored directly. At least one means of accomplishing this is by revising the phrase "restoration of resources and services" used throughout the document to "restoration of resources and thereby the services they provide." Additionally, it is appropriate that the effects of restoration activities upon such uses as sport and commercial fishing, recreational use, and tourism be included in the environmental consequences discussion because ecological, aesthetic, economic and social direct and indirect effects of the proposed action must be analyzed. 40 C.F.R. § 1508.8. However, this effects analysis must be distinguished from directly undertaking restoration actions to enhance sport and commercial use of fisheries, recreational use, and tourism. This distinction is frequently not made in the DEIS.

3. References to "subsistence" should be revised to "subsistence uses," the term defined by ANILCA and quoted at page 3-33 of the DEIS. Moreover, the perception that resources used for subsistence remain contaminated does not constitute a natural resource that can be directly restored. User perception can only be changed through the restoration of the natural resources used for subsistence.

4. Failure to analyze the effects of expected monitoring and research activities is a weakness in the analysis, particularly since a research and monitoring plan are not included in the DEIS. This does not allow a decision-maker or reviewer, by examination of proposed activities in the monitoring plan, to verify the DEIS assumption that restoration monitoring and research activities are not likely to produce environmental effects. Moreover, appropriate monitoring and mitigation measures must be identified. 40 C.F.R. §§ 1502.14(f), 1505.3, 1508.20.

5. Failure to include the small parcels that may be proposed for purchase in the effects analyses for habitat protection activities leaves the DEIS potentially subject to supplementation because the small parcel evaluation may be considered new information regarding the proposed action or its impacts. 40 C.F.R. § 1502.9(c).

6. Consider including the definition of significant restriction of subsistence uses articulated in *Kuanaknana v. Watt* as a guideline in the ANILCA Section 810 analysis discussion may include as well. The Forest Service has included this discussion in the Section 810 analyses in its recently released EISs. In addition, it appears the preliminary findings from the "Tier I" analysis of Section 810 indicate that the proposed action will not significantly restrict subsistence uses. If that is the conclusion, the "Tier II" analysis does not apply. *See Hanlon v. Barton,* 740 F.Supp. 1446, 1448 (9th Cir. 1988).

7. The DEIS should more carefully discuss the use of hatchery enhancement activities as related to the restoration of wild stocks of fish. The ability to fund hatchery activities with the joint trust funds is questionable. Hatchery stocks are not considered

natural resources for which joint trust funds may be expended. The enhancement of hatchery stocks to divert the fishery of wild stocks is a proposed restoration activity replete with potential detrimental effects regarding its effects on the wild stocks.

I am available to further discuss these comments.

cc: J.Wolfe, EAM
D.Gibbons, EAM
B.Roth, DOI SOL
K.Chorostecki, NOAA GC

E
EIS

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FAX COVER SHEET

TO: Rod Kuhn Date: 5/16

No. of Pages: 14
(following this page)

☐ R1 ☐ R2 - Hab. ☐ R2 - Rest. ☐ R3 ☐ SPCO ☐ CACI ☐ All Rest. Team ☐ All Trustee Council

FROM: Jerome

MESSAGE: Hard Copy to follow

Exxon Valdez Oil Spill Trustee Council

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

13 May 1994

TO: Rod Kuhn, EIS Coordinator

FROM: for Carl Rosier, Commissioner ADF&G Kevin Brooks

SUBJECT: Review of Preliminary Draft Environmental Impact Statement

Pursuant to your memorandum of April 30 attached is the Alaska Department of Fish and Game's review comments on the preliminary Draft Environmental Impact Statement for the Exxon Valdez Oil Spill Restoration Plan. While we reviewed the document principally for policies, assumptions, and conclusions, we made grammatical changes where they helped to clarify the sentence yet did not change the intent. We kept grammatical changes to a minimum. The comments are of both general and specific nature. Should you have questions about our comments, please contact Ken Chalk, Habitat and Restoration Division, Anchorage directly at 267-2421. He coordinated the internal review process. Detailed, department-wide, review comments will be provided during the formal DEIS review period.

I am impressed with the work you and other members of the interdisciplinary team did on this document. To stay within the compressed time schedule and still do a thorough job is a commendable accomplishment. Please pass on my appreciation to other members of the team.

Attachment

cc: C. Meacham
F. Rue
J. Montague
K. Chalk
B. Hauser

ADF&G Review of pre-DEIS for EVOS Restoration Plan

General Comments

Need Glossary to explain technical terms

amphipod	callianassid	cataract
emergence	escapement	eyed stage
gammarid	isopod	juvenile
long-term	overescapement	pre-smolt
redd	sac-roe	short-term
smolt	sphaeromid	

Need a list of Acronyms

Beginning with page 2, page numbering is not consistent. Appears that pages on left have page number before chapter number.

Check for omitted words. Recommend use of a grammar checker. They are a lot of work but well worth the time. WordPerfect 5.2 and above have one built in.

Some words may be omitted without changing the meaning of the sentence. Check for comma splices (grammar checker will help here).

Throughout the document the terms short- and long-term are used without explaining how these levels of benefits were calculated. Explain.

Alternative 5 is exceptionally well-written.

The term "parcels" brings up the question of "how big is a parcel"? How many acres (or hectares)? Can they be identified in a table with a number and their sizes?

Specific Comments

Chapter 1

Page 1

Paragraph 1. First sentence should read "The ***Exxon Valdez*** **Oil Spill Trustee** Council . . ."

Paragraph 3. First sentence should read "The purpose of the . . . remaining funds (approximately $620 million ~~after final reimbursements~~) should be . . ."

Page 5

Paragraph 2. First sentence should read ". . . studies during the **spring and** summer of 1989 . . ."

Paragraph 3. Second sentence should read ~~Following~~ "As directed by the . . . Trustee Council ~~decided to continue development~~ developed a restoration plan and ~~to allow for~~ obtained public participation.".

Page 6

Under General restoration. Second sentence should read "It also includes . . . use of affected **resources and** areas, such as . . ."

Under Monitoring and research. Third sentence should read "Restoration research . . . in the design, ~~develop~~ **development**, and ~~implement~~ **implementation** of new . . ."

Under Administration and public information. Second sentence should read "As more projects . . . allocated to management and administration ~~increases~~ **decreases.**"

Page 7

Paragraph 2. Second sentence should read "Site-specific actions by the Trustees may be subject . . ."

Page 11

Paragraph 1. First sentence is ideally true, but would it be necessarily true in order for a project to be approved? For example, recovery of sea otters could adversely impact shellfish resources.

Paragraph 1. Second sentence should read "The benefits to these other resources . . . their habitat **and increasing their food supply as a** secondary ~~benefit~~ **benefits** of restoring . . ."

Issue 5:. After second sentence add the following sentence "**Subsistence users also report declines in the abundance of many subsistence resources.**"

Page 12 Under Impact Topics Studied by the EIS, the first two sentences and Table 1-1 are misleading. Readers might assume that these were the only species studied or injured. They would then wonder why we might study mussels or clams or helmet crabs, for example.

Paragraph 3. Second sentence should read "In the Draft . . . status, not by **measured** population decline."

Page 14 The list of resources and services is confusing. It implies that only those specific fish, marine mammals, birds, and services will be analyzed for impacts while a wide range of intertidal resources will be analyzed. Be more specific about those animals and plants included in intertidal resources.

The list of programs and plans, at the bottom of the page, should be in the same order as they appear in the findings (beginning on page 15).

The 1989 City of Whittier Coastal Management Program does not appear in the findings.

Eyak Lake AMSA Cooperative Management Plan appears in the findings but not in this list.

Page 19 Paragraph 1. Under - intertidal organisms should read "(other than clams, **mussels,** and *Fucus*)-no actions proposed,"

Chapter 2

Page 11 Paragraph 2. First sentence should read "Of the remaining . . . **$93** to **$124** million . . ."

Page 14 Table 2-1, Issue 3, Alternative 2. Change to read "Habitat Protection would . . and therefore ~~promote beneficial~~ **prevent adverse** ecological change to the largest degree." General restoration projects are intended to promote beneficial ecological change to the greatest degree.

Page 16 Remove note at bottom of Table 2-2 and add a row called **Total**; place **$620** at the bottom of each column.

Page 17 Table 2-3. Alternative 2 for Harlequin Ducks should read **Mod**, not High. Food, rather than nesting habitat is limiting for Harlequins. They do not eat fish eggs but they do eat mussels and oiled mussels may be involved in preventing recovery. Recovery of oiled mussel beds could have a larger impact.

Page 17 — Table 2-3, Issue 2 for Pacific Herring should read ~~Moderate~~ **Low-Moderate**. Most land uses would not affect herring though a few could have significant adverse effects.

Chapter 3

Page 4 — Paragraph 3. Fourth sentence is incorrect. These species are no longer abundant in Prince William Sound. They have been overfished by sea otters.

Page 6 — Under Clams. Insert the following sentence between the second and third. **However, in many instances cleanup activities destroyed nearly all the clams on oiled washed beaches.**

Page 20 — Paragraph 1. Second sentence states that management plans developed by the North Pacific Fishery Management Council become law. Perhaps this should be **regulation** since only Congress makes laws.

Page 46 — Table 3-2. Check spacing between columns.

Page 48 — FRED Division is now incorporated into Commercial Fisheries Management and Development Division.

Page 49 — Table 3-3 needs source.

Page 51 — Paragraph 1. Last sentence reads "The closure is expected to continue at least through 1993." Do you mean 1994, or should this sentence even be here?

Paragraph 2. Second sentence. Explain (briefly) why an overpopulation of fry would cause a dramatic reduction in smolt production.

Page 53 — Table 3-3 should read Table 3-4.

Chapter 4

Page 1 — Paragraph 3. Second sentence should read "In this programmatic . . . (2) private landowners ~~will~~ **may** harvest . . ."

Page 3 — Paragraph 4. Second sentence should read "Alternatives 1 through 5 . . . found in Table ~~3-3~~-4, Chapter 3, Page 3-53."

Page 4 — Paragraph 4. Are these the only key assumptions or is it just not possible to conduct an assessment that takes in the additional variation?

Page 4 — Paragraph 5. Add **Page 4-6** to end of sentence.

Page 10 — Paragraph 4. Last sentence. Define MVD.

Page 11 — Paragraph 4. First sentence should read "In this alternative, . . . would remain ~~volatile~~ **toxic.**"

Paragraph 4. Last sentence should read "For instance, . . . not classified as "mussel beds". ~~and~~ No techniques **have been proposed** that would clean . . ."

Page 14 — Paragraph 1. Second sentence should read "However, recent trend counts . . . near Tugidak Island **(vicinity of Kodiak Island)** give no indication . . ."

Last paragraph, Second and third sentences. How and why is Prince William Sound differentiated from the oiled portions of the EVOS area?

Page 17 — Paragraph 1. Fourth sentence should read "The long-term effects . . . would **possibly** be a loss of . . ."

Paragraph 3. This sentence has nothing to do with the EVOS area. Delete.

Paragraph 6. Second sentence (bottom of page) states ". . . that unless this narrow zone is developed correctly . . ." This sentence should be deleted. This section discusses the No Action Alternative. No development will occur under this alternative.

Page 18 — Paragraph 1. What predators are we talking about?

Paragraph 4. Were these known nesting sites or is this speculation? Explain. Is logging or development planned in the known nesting areas. If yes, are these areas ranked high for acquisition under some other alternative?

Paragraph 5. Second sentence should read. "However, projected logging . . . on the long term, ~~will~~ **may** prevent restoration . . . . ".

Page 20 — Under Conclusions - long-term effects: Explain how long to recovery and why it will take that long.

Page 21 — Paragraph 3 (top of page 22). "Harvest levels would remain at below prespill levels . . . . ". Explain why.

Paragraph 3. Next sentence. "Under this alternative, lands in the . . . some subsistence species would remain . . ." What are these species?

Page 25 — First paragraph. Commercial fishing. Discuss the effects of shifting efforts to other species (rockfish, for example).

First sentence Under Sport Fishing should read "If there is no action . . . service will depend on natural recovery rates . . ." Also, this sentence runs on. Too many "ands".

Under Sport Fishing - Conclusions - long-term effects. "Real or perceived recovery . . . may require 10 to 20 years.". What is this based on?

Page 25 — Last Paragraph. Last sentence should read "The quantitative analysis ~~follows.~~ **is shown on Table 4.3).**

Page 34 — Under Sockeye Salmon - Conclusions - long-term: First sentence should read "Habitat protection . . . wild-stock production; however, ~~fewer than half~~ about 21 percent of the individual . . . for sockeye salmon.".

Last paragraph. Last sentence should read "Although the average value of forested habitat . . . a high overall rating for ~~pink salmon~~ Pacific herring . . ."

Page 36 — Paragraph 1 under Subsistence. First sentence should show how many acres in each parcel ranking.

Paragraph 1. Next to last and last sentences refer to discussion of the effect of this alternative lies elsewhere in the DEIS. Explain where.

Last paragraph. Second sentence should read "Long term, the level . . . in this alternative ~~would~~ may allow for . . ."

Page 39 — First sentence. - long-term: Sentence should read "Habitat protection and acquisition actions ~~will~~ may have a long-term value . . ."

First paragraph under Economy is confusing (and contradictory). How can land acquisition have low to moderate effect on commercial and sport fishing and moderate effect on individual fish species recovery result in an overall moderate economic benefit?

Page 44 — Paragraph 2. Last sentence. How many acres in these 60 locations? KAK ✓

Paragraph 3. Second sentence should read "There have been no EVOS studies to determine . . ." Others have documented reproductive impairment in some sea birds after ingesting oil (Epply and Rubega, 1990; Fry and Addiego, 1988; Fry et al., 1986).

Page 49 First sentence under Birds should read "Under this alternative, . . . enhancing their productivity **potential** and subsequent . . ."

Last sentence under Harlequin Duck, Conclusions should read "The long-term effects of this alternative ~~would~~ **may** have a high . . ."

Page 51. Paragraph 1. Last sentence should read "A total of 53 percent **of the parcels** is rated as moderate or high value.".

Paragraph 2. Last sentence should read "A total of 60 percent **of the parcels** is rated as moderate or high value.

Under Conclusions - long-term effects: Sentence should read "Habitat protection and acquisition actions ~~would~~ **may** assist the recovery . . ."

Page 52 Paragraph 1. Second sentence should read "Therefore, the number of parcels . . . between 62 **and 81**. ~~and all parcels that are available.~~

Last sentence should read "A total of ~~17~~ **21** percent **of the parcels** is rated as moderate or high value.".

Paragraph 2. Last sentence should read "A total of ~~17~~ **21** percent **of the parcels** is rated as moderate or high value.".

Paragraph 4. Last sentence missing the reference.

Paragraph 6. First sentence should read "Although extensive . . . sites ~~at which~~ to ~~operate~~ **apply** this technique . . ."

Page 54 Under Pacific Herring Habitat Protection. Begin new paragraph after line 5.

Second sentence in new paragraph should read "Therefore, the number . . . range between 62 ~~parcels~~ and 81. ~~that are available.~~ Last sentence should read "A total of 54 percent ~~is~~ **of the parcels are** rated as moderate or high value.".

Last sentence in next paragraph (new number 3) should read "A total of 63 percent **of the parcels** is rated as moderate or high value.".

Page 55 Under Conclusions - long-term benefits. First sentence should read "Habitat protection and acquisition actions ~~would~~ **may** have a long-term . . . by helping to assure maintenance of ~~production.~~ **reproductive potential.**".

Page 57 Under Habitat Protection, first sentence. How many parcels in each group (low, medium, high) and how many acres in each.

Page 58 Paragraph 1. What are the low, short-term and low to moderate long-term benefits based on? Explain.

Paragraph 1. Second sentence should read " Protecting lands . . . mining and logging ~~would~~ may help keep recovering . . ."

Paragraph 2. Second sentence. Is it also possible that land prices may be higher as well?

Paragraph 5. Last sentence. Reference the sections and give page numbers.

Page 59 Paragraph 5. Fourth sentence should read "The long term benefit to ~~pink~~ sockeye salmon . . ."

Page 63 Paragraph 3 under Sport Fishing. Second sentence should read "Therefore, the number . . . to range between 62 and 81 parcels . . ."

Page 64 Paragraph 3 under Impact on the Economy. Second sentence. Is there such a word as "Respending"?

Paragraph 3. Third sentence should read "There is also spending, . . . final demand and 766 employees.".

Page 67 Paragraph 2. Second sentence should read "Increasing the protection . . . the spill area ~~will~~ may may be beneficial . . ."

Paragraph 2. Third sentence should read "The general restoration actions ~~can~~ may be beneficial . . ."

Page 69 Paragraph 3. Second sentence. See our comments for page 44, paragraph 3.

Page 75 Paragraph 2 under Murres. Last sentence should be deleted. Chapter 4 is a description of the Environmental Consequences of a particular alternative. The last sentence appear to be a justification for future projects.

Paragraphs 3 and 4 should be rewritten to reflect problems within the EVOS-affected area.

Page 77 Paragraph 3 under Pink Salmon. Second sentence should read "Therefore, the number . . . range between 34 and 81 parcels.", ~~and all parcels that are available.~~

Last sentence should read "A total of 53% of the parcels is rated as moderate to high value."

Paragraph 4. Last sentence should read "A total of ~~70%~~ 71% is rated as moderate or high value.".

Page 78 Last paragraph on page. Second sentence should read "Therefore, the number . . . range between 34 **and 81** parcels. ~~and all parcels that are available.~~

Last sentence should read "A total of ~~17% is~~ 21% **of the parcels are** rated as moderate or high value.".

Page 79 Paragraph 4 under Restoration Actions. Last sentence missing the reference.

Page 81 Last sentence on page should read "Therefore, the number . . . range between 34 **and 81.** ~~parcels and all parcels that are available.~~

Page 82 Under Conclusions - long-term. Sentence should read "Habitat protection and acquisition actions ~~will~~ **may** have a . . . of production,".

Page 85 Paragraph 1 under Habitat Protection. Show how many parcels/acres in each ranking.

Paragraph 2. Last sentence should read "Protecting lands . . . ~~would~~ **may** help recovering . . ."

Last paragraph. Third sentence should indicate which sections and pages.

Page 86 Paragraph 1. Last sentence should read "Reducing disturbance . . . oil spill area ~~would~~ **may** have a . . . ".

Page 87 Paragraph 3. Second sentence introduces the term "strong" short-term benefits. Is strong the same as high? At minimum, it should be defined.

Page 91 Paragraph 1. First sentence should read "Development of new runs ~~will~~ **may** provide a . . . ".

Page 92 Paragraph 1. Second sentence should read "Therefore, the number . . . range between 34 **and 81** parcels. ~~and all parcels that are available.~~

Third and fourth sentences indicate no additional benefit for sport fisheries if all 81 parcels are purchased. Explain why all 81 parcels should be purchased if there is no additional benefit. Is this really what is meant?

Page 95 Paragraph 2. Second sentence should read "Habitat protection may provides protective benefits to ~~all~~ resources . . . EVOS ecosystem."

KAK Rod

Page 95 — Third sentence should read "Increasing the . . . spill area ~~will~~ may be beneficial . . ."

Fourth sentence should read "The general restoration actions ~~can~~ may help resources . . ."

Page 96 — Table 4-7. Sum of parcels on first line under Benefits does not equal 81. Are the remaining 4 of no value? Explain.

Tables like this would be very useful in the four previous sections of Alternatives.

Explained in preceding paragraph.

Page 97 — Paragraph 2. First sentence should show the page numbers where this discussion on impacts may be found.

Page 98 — Paragraph 2. Last sentence should show how many acres are contained in "Approximately 60 locations . . ."

Paragraph 3. Second sentence should read "There have been no EVOS-funded studies . . ." See comments for page 44, paragraph 3.

Page 100 — Table 4-8. Sum of parcels on first line under Benefits does not equal 81. What about the remaining 22?

Page 103 — Table 4-9. Sum of parcels on first line under Benefits does not equal 81. What about the remaining 3?

Page 105 — Paragraph 1 under Harlequin Duck. First sentence should read "Acquiring nesting . . . forested lands ~~would~~ may have the highest . . ."

Paragraph 1. Do the high priority parcels contain known nesting areas? If not, explain why they are high priority.

Page 105 — Delete the next four paragraphs. They are justifications for projects and do not belong in Environmental Consequences.

Page 108 — Paragraph 1. First sentence. Change "cornerstone" to "keystone".

Second sentence should read "On the long term, land acquisition containing critical nesting habitat is the . . ."

Last paragraph. Last sentence should read "Of the parcels . . . ~~70% or more~~ 71% are rated . . ."

Page 109 Last sentence in third paragraph under Comprehensive Restoration Actions is incomplete.

Page 110 Paragraph 2. First sentence should read "The potential . . . ~~which~~ that may . . ."

Second sentence should read "Although . . . potential sites to ~~operate~~ apply this technique . . ."

Paragraph 6. First sentence missing the reference.

Third sentence. Rewrite to use "however" less. Also, (Schollenberger, 19939).

Page 111 Check for use of "however".

Last paragraph. First sentence should read "Relocation of hatchery runs ~~will~~ may provide a benefit . . ."

Page 120 Last paragraph. First sentence should read "Protecting lands . . . mining and logging ~~would~~ may help recovering . . ."

Page 122 Paragraph 2, second sentence. "uses" or "users"?

Paragraph 3, Third sentence should read "Long-term . . . appropriate ~~siting locations~~ sites.

Paragraph 5. Fourth sentence should read "The long-term benefit to ~~pink~~ sockeye salmon . . ."

Page 123 Paragraph 2. This is the last year (1994) that actual food testing is planned so this action may not be valid any longer.

Page 126 Paragraph 5. First sentence should read "Development of new runs ~~will~~ may provide a . . ."

Page 127 Paragraph 2 under Sport Fishing. Second sentence should read The criteria . . benefit ~~commercial~~ sport fisheries . . ."

Page 128 Under Conclusions - short-term. Was a "put and take" fishery considered?

Page 129 Fourth sentence should read "The corresponding . . . loss of ~~278~~ 279 jobs in . . an increase of ~~320~~ 321 in services."

Page 131 Discuss those resources that these projects would affect. Be specific.

Page 134 Paragraph 1 under Harlequin Ducks. Sentence 2 indicates that hunting regulations could be adjusted to negate disturbance to nesting harlequins. These regulations have already been adjusted.

Page 135 Under Marbled Murrelets, explain how Alternative 5 would result in a negligible increase in the prey base and how the combined effects of Alternative 5 and the cumulative actions described would produce a high overall benefit for marbled murrelet populations.

Last paragraph, last line states that accidental leakage of gas from the proposed Trans-Alaska gas pipeline is not expected to harm the aquatic environment. Please explain why leakage under a stream would not be harmful (if you can).

Page 136 Paragraph 2. Isn't Child's Glacier well outside the spill area. Why is it even being discussed here?

Under Conclusions - short-term effects. What is being discussed here? Herring, sockeye, or pinks?

Page 137 Paragraph 1. See comments above regarding harm to the aquatic environment from a leak in the gas pipeline.

Under Conclusions - short-term effects. Explain what is being discussed here.

Chapter 6

Page 4 Section beginning at third full paragraph and continuing on to top of page 4 appears to be repeated in next section.

Page 6 The "bullet" items at the top of the page are issues. They should appear under the first paragraph under "Issues".

Appendix C

Page 4 First sentence on page should read "". . . the numbers of pink salmon returning to Cannery Creek in Prince William Sound."

Appendix D Explain what IMPLAN is. Since Appendices should stand alone, define acronyms in them, even though defined elsewhere.

Appendix F	Some way of separating the 1992, 1993, and 1994 Status Reports would be helpful.
Page 6 (1993)	These are monitoring projects, not habitat protection. They should be between pages 9 and 10.
Page 5 (1994)	Include 94428 Subsistence Restoration Planning and Implementation, and related information.
Page 8 (1994)	Comment for 94199 should read "Approved up to ~~$50.0~~ **147.0** for initial work, including NEPA compliance.".
Page 10	Include 94427 Harlequin Duck Boat Survey, and related information.

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

To Rob Kuhn	# of pages ▶
Dept./Agency FS (EVOS)	From Barry Roth, DOI
Fax # 276-7178	Phone # (DOI)
NSN 7540-01-317-7368 5099-101	Fax # GENERAL SERVICES ADMINISTRATION

Barry Roth, DOI, Office of the S
Draft Restoration Plan

Ch. 1

P.2 Litigation and Settlement

¶2 Capitalize "C" and "A" in Civil Actions.

Revise 3rd & 4th sentences to read: Generally, these payments are deposited in the Registry of the U.S. District Court for Alaska where they are invested through the Federal Court Registry Investment System. As funding needs for restoration projects are identified, the Trustee Council, through the Alaska Department of Law and the U.S. Department of Justice, applies to the Court for disbursement of funds from the Registry.

¶4 Add after "assessment.": Such amounts are not deposited in the Court Registry, but paid directly by Exxon to the respective government.

P.3 ¶1 Line 1: strike "Trustee Council" and insert "six Trustees".

Line 9: insert/substitute the following after "NOAA.)." In accordance with a subsequent Memorandum of Understanding (MOU) executed by the six Trustees, the Alaska-based EVOS Trustee Council was formed to coordinate and oversee the development and implementation of the restoration program. The State Trustees serve as members of the Trustee Council, along with a representative of each of the Federal Trustees.

Line 12: correct title is "Fish and Wildlife and Parks".

¶4 Line 5: Strike "Full" and capitalize "Public". [Full has no particular meaning in this context and doesn't add to the commitment. Also, change "would" to "will"

P.5 Line 17: It appears but I am not certain that this should read "Since 1989, 72 studies...." If "In" is actually correct, then it appears that tense should be changed from "have been" to "were".

Lines 22-24, change to read: "Following the October 9, 1991 approval of the settlement between the Exxon companies, the United States and the State of Alaska, the Trustee Council decided to continue development of a restoration plan and to provide for meaningful public participation therein."

P.6 Monitoring and Research

change research sentence to read: "Restoration research is that research which is necessary to clarify the causes of poor or slowed recovery, or which assists in the design, development and implementation of new technologies or techniques and approaches to restoration of the resources and services injured by EVOS." [My concerns are that we can only do necessary research related to restoration and that "could clarify" is to weak.]

Description of the Process

¶1 I am not sure what the sentence means about the DEIS being subject to 810. Are you trying to state: "Because decisions made in the restoration process may authorize the use, occupancy, or disposition of Federal public lands, the Draft Restoration Plan is also subject to evaluation with respect to its impact on subsistence activities in accordance with §810 of the Alaska National Interest Lands Conservation Act (ANILCA)."

P.7 ¶2 revise to read: As a programmatic DEIS, this document does not address site-specific situations, proposals or regulations. Such matters will be dealt with in subsequent Annual Work Plans issued by the Council. Such individual matters may also be subject to further review under NEPA as well as §810 of ANILCA."

Public Comment Period

this should either read: "... hearing(s) will be announced" or "... hearing(s) were announced [where or how may be obtained]"

P.8 Roles of the Agencies

¶1 Insert at the end of the 1st sentence: "in the decision making process."

2nd sentence: insert "virtually" before "all". Some decisions such as appointment of Exec. Dir. and review of candidates were made in exec. session.

¶2 Line 2: revised to read: "since approval of the settlement, the Trustee Council has provided five different opportunities for formal public comments to be submitted."

Chapter 4

P.98 Conclusions: with respect to long term benefits, the sentence has no subject. Suggest it read: "for direct

restoration actions, these are unknown...."

P.141-2 In discussing the impacts on the economy, the focus is apparently on the forest portion. Is it appropriate, possible, to suggest that such impacts are likely to be offset by favorable impacts on other sectors of the economy from a successful comprehensive restoration program, e.g., commercial fishing, recreation and tourism.

E/EIS

STATE OF ALASKA

WALTER J. HICKEL, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION

907 465-5000
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OFFICE OF THE COMMISSIONER
410 WILLOUGHBY AVENUE, SUITE 105
JUNEAU, ALASKA 99801-1795

MEMORANDUM

TO: Jim Wolfe
Trustee Council Representative

DATE: May 13, 1994

FROM: John A. Sandor
Commissioner, ADEC

SUBJECT: Review Comments, Restoration Plan Draft EIS

Thank you for the opportunity to review the Draft EIS which we realize was prepared in a short time frame. We have identified a number of items that should be changed. I am hopeful we can resolve any differences quickly in order to ensure that a final EIS is adopted on schedule.

INTRODUCTION AND GENERAL COMMENTS

Date the dollar amounts (p 1 and elsewhere). The EIS notes that $620 million remains for restoration after final reimbursements. That number continues to change as spending occurs. Thus, the figure should be dated: "*As of* _____, there remains $620...."

Administration and Public Information, p 1-6. It is untrue that *percentage* of administration increases with the number of projects. The total for administration may increase, but the percentage will decrease.

Public Meetings, p 1-9. Add Karluk to the list of public meeting locations for the fourth period.

Issue #2, first sentence, p 1-10. Some restoration options restore multiple resources. Thus, the first sentence is incorrect.

Impact Topics, p 14-1. Designated wilderness and archaeology are not services, they are resources. In addition, the title we have been using is "Designated Wilderness Areas."

Emphasize that Alternative #5 has changed. Those close to the process understand that the Draft Restoration Plan is alternative five, and that the plan is different from the brochure

alternative #5. This is not obvious to the casual reader, however. It is only mentioned obliquely in two locations. The DEIS should be more explicit. Locations for this information should include the introduction (Chapter 1), before Table 2-2 (the financial assumptions), and when alternative #5 is introduced in Chapter 2 (page 2-10).

Definitions. The definitions on page 1-6 incorrectly summarize those from page 8 of the Draft Restoration Plan. Habitat Protection and Acquisition is fine. General Restoration is incorrectly redefined to be manipulation of the environment and possibly managing human use. That is not complete. It may also include protective strategies like reduction of marine pollution or facilities. Monitoring and research is also incorrect. The EIS definition includes feasibility studies of technology that we would include in General Restoration. The change is not major — both are allowable under the settlement, but the Draft Restoration Plan and the Draft EIS should use consistent terminology. Use the definitions on page 8 of the Draft Plan. If you need to expand, use the definitions on page 21 of the plan. But delete, from monitoring and research, the "what can be done to accelerate the process" And delete "then assist in the design, develop, and implement new technologies and approaches...expected rates."

Prince William Sound Plan for State Lands on page 1-15 is correctly titled the "Prince William Sound Area Plan for State Lands." The paragraph then incorrectly refers to it as "the Forest Plan" three times.

Projects designed to restore or enhance a resource. The first element of the last policy in Alternative 5 (page 2-11) should be moved to "Program Elements Common to All Alternatives" (page 2-3). That policy is:

"Projects designed to restore or enhance an injured service:
1) must have a sufficient relationship to an injured resource...,"

This policy is a legal interpretation of the settlement decree. It is therefore *not* appropriate to analyze or vary with alternatives. It was developed by Craig Tillery (Ak Dept. of Law) and Bill Brighton (US Dept. of Justice) to resolve the extent to which restoration to help services was allowable under the court decree. Thus, it is more of a legal interpretation than a policy that can be varied with the alternatives.

Confusing Analysis with Commitment. The DEIS projects budgets for analysis purposes, and assumes for analysis purposes that certain activities will occur. The casual reader will not understand these fine distinctions. They will come away with the understanding that these are budget allocations and that there is a commitment to complete the listed activities. Please insert a sentence at the beginning of the list in every alternative (especially Alternative #5) in bold type. An example sentence might be: "These activities are assumptions made for purposes of analysis. No commitment has been made to complete any or all of these actions, and other activities will likely be considered."

Overestimating Purchase Acreage. Page 2-6, Alternative #2, reads that "it is assumed that sufficient funds will be dedicated to Habitat Protection to protect *all* of the parcels shown in Figure..." All parcels seems implausible. Under any realistic estimate of land prices, we

lack funds to purchase all of the large parcels. Implying that we could purchase essentially all private land in Prince William Sound (or the spill area for that matter) raises expectations beyond the possible. The brochure reads that if we spent the entire amount of the settlement on habitat purchases, we could purchase approximately 14% of the private land in the spill area. This comment affects Alternative #2, and the other alternatives as well (see also 2nd full paragraph page 2-7, 3rd full paragraph page 2-9, etc.).

The existing character of the spill area will be maintained. That sentence appears in Alternative 3 (last full line, Page 2-6). That is not the policy in Alternative #3. The Trustee Council cannot implement that goal. Please use the brochure language.

Inappropriate activities in Alternative #5. Some actions attributed to Alternative #5 are unlikely to be implemented — the Trustee Council has already considered and rejected them. To continue to analyze them as if they would be implemented will convey incorrect information to the reader. These are:

Reduce disturbance to harbor seals, and pigeon guillemots. There is no evidence that this is needed. It would require broad-based restrictions that the Trustee Council is unlikely to entertain or recommend. Also, the Trustee Council does not have management authority. The agency with management authority would have to adopt the restrictions.

The activity concerning reducing disturbance to murres is a more appropriate activity, because there is some evidence that it might help and the restrictions could be more focused. But the Trustee Council roundly rejected the idea a number of times.

Predator Control — 15 islands. This effective activity has been funded in the past. But the policy of "outside the spill area....under the following conditions..." limits the number of islands that are likely to pass that test. Five to ten is more likely. Fifteen seems unlikely.

CHAPTER 3

Affected Environment. Page 3-9, ¶2. The paragraph implies that out of a population of 2,000 — 5,000 harbor seals, commercial fishing kills 2,800 per year. That doesn't seem right.

Page 3-11, ¶3. The first sentence has an incorrect tone. It seems to whine that Congress does not always agree with USF&WS staff priorities. Just stating the facts would appear to be sufficient.

CHAPTER 4

Chapter 4, Table 4-1. The table is unclear. It should stand on its own without requiring the reader to dig too deeply into the text. I cannot figure out where the numbers come from or what they mean. Where does $329,000 for a Reserve come from? All of these numbers

appear inconsistent with those in Table 2-2. Also, "Restoration" should probably be "General Restoration" (because legally, restoration includes monitoring, habitat protection, and administration as well).

Alternative #1, page 4-19. The conclusion paragraph implies that no action will result in a 10% reduction in the pink salmon population in Prince William Sound! That is wrong. The notion that almost 1 million pink salmon will die in the Sound (each year) if the Trustee Council doesn't act seems a little hard to believe. (Also, I would rename the category "long-term effects" rather than "benefits" as you are discussing a negative benefit.).

Alternative #1, page 4-24, 1st full ¶. "If this alternative is selected, logging and/or mining is likely to occur throughout the area..." is untrue. There has been no mining of significant scale in the area since the 1930s; no applications that I know of are pending (though there may be some). Thus, the scenario that if the Trustee Council does not act, mining will occur throughout the area seems an odd prediction. Similarly, there are a few areas in the spill area where logging is planned. The sentence incorrectly implies more than that.

Alternative #2, page 4-35. 1st ¶ under Social and Economic Impacts. The prediction that 863,100 acres would be purchased is false precision. Given that precision, it is hard to believe that these figures are for analysis purposes only. They give the reader the impression we know precisely what will purchased under each alternative. Please generalize the numbers. (This same comment is relevant for alternatives #3-#5.)

Alternative #2, page 4-36, 2nd ¶, Cultural Resource Conclusions. The conclusion that purchasing archaeological sites protects them is odd. ANCSA 14(h) established a process by which BLM takes archaeological sites out of Forest Service and Fish and Wildlife Service management and conveys them to Native ownership for protection. That process has been on-going for almost two decades. The assertion that protection occurs by purchasing parcels which the federal government spent significant staff and money to convey to Native ownership for protection, and reconveying them back to state and federal ownership for protection, is somewhat odd. (This same comment is relevant for alternatives #3-#5.)

Alternative #2, page 4-37, 3rd ¶, Recreation Conclusions. This paragraph asserts that the short-term benefits of habitat protection to recreation is negligible, and the long-term benefits are only moderate. The many years of public comment concerning Katchemak Bay, the substantial comment received on the brochure that advocated increased habitat protection, and the effort of Cordova recreationists to promote purchase of Orca Narrows, argues for greater benefit.

Alternative #5. Introduction, p 4-95. Add language to let people know (1) that this alternative is different than the brochure alternative #5; and (2) that the Trustee Council may not implement any or all of the assumed actions, and may in fact implement others not listed. Change the first sentence as follows: "In this alternative, the general restoration program focuses on the status of recovery of injured resources ~~rather than on the degree of injury~~

~~caused by the oil spill.~~ (deleted language is needlessly negative).

Alternative #5, Murres, Predator Control, p 4-106, 2nd ¶. Eliminate discussion about murres in the Pribilof Islands. It is irrelevant. Any activity that far from the spill area is inconsistent with policy concerning "activities will be in the spill area unless..." Eliminate "Reducing Disturbance in following three paragraphs (see previous discussion about this activity which has been previously rejected by Trustee Council).

Alternative #5. New Recreation Opportunities, and Promoting Recreation Opportunities. Good discussion, however, note that facilities and changes would be "consistent with the character and public uses of the area." To not mention that policy may instill a fear of changes that are not intended.

APPENDICES. In general, the DEIS is too long. Shortening it will make it a less threatening document. The appendices are an easy place to cut.

Appendix A. Eliminate the appendix. Its unintelligible anyway without further information in the original document. Reference the original document instead. *"Comprehensive Habitat Protection and Acquisition Process: Large Parcel Evaluation and Ranking*, November 1993, explains the ranking and evaluation for potential protection or acquisition of large parcels in the spill area. It includes the evaluation and ranking of all parcels greater than 1,000 acres in the spill area whose owners were willing to participate in the protection process as of November 1993." If people want it, they can call a toll free number and have it mailed.

Appendix C. Eliminate the appendix. Its a long treatise on other ADF&G permitting authorities. It is unclear why the DEIS chooses this process to explain as opposed to Alaska Forest Practices Act, Coastal Management Plans, or the whole host of other acts and requirements that influence restoration and other activities in the spill area.

Appendix E. This is a huge appendix for the amount of information it imparts. Reference it as "other documents available."

E/EIS

UNITED STATES DEPARTMENT OF COMMERCE
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FAX TRANSMISSION

May 13, 1994

FROM: STEVEN PENNOYER
DIRECTOR, ALASKA REGION

TO: Rod Kuhn

TEL: 278-8012 FAX: 276-7178

PAGES: 4

SUBJECT: Comments on Draft EIS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

May 13, 1994

MEMORANDUM FOR: Rod Kuhn
EIS Project Manager

FROM: Steve Pennoyer
Trustee Council

SUBJECT: Comments on Draft EIS

My staff and I have reviewed the Draft EIS for the Restoration Plan and offer the following comments.

In general, we have no substantive comments on the content of the EIS. It seems to be arranged logically and appropriately for compliance with NEPA. It contains a vast amount of reading material to be digested in a short review time. I trust that, with the number of people conducting reviews, errors and omissions missed by one of us will be caught by another.

The EIS Team is to be commended for preparing a document of this complexity and size in the short time allotted to you and for the quality of the draft product you presented for our review. I believe that it should need only minor changes before it is released. However, the Appendices are partially incomplete. I would like to see Appendix B--Species Names before the DEIS is printed.

I hope the following comments will be helpful to you.

Chapter 1 - Purpose and Need

p. 6. Under "Habitat protection and acquisition" you state one option is "changing the management practices of publicly held lands". Is it not possible to also change the management practices on private lands, i.e by requiring buffers or clearing of debris, etc.?

p. 13. Table 1.2 lists "Other Resources" under the Services table. These should be placed in Table 1.1.

p. 14. It is not completely clear why the DEIS chooses to address "Impact Topics" only for a short-list of Resources and Services. I believe it would clarify the DEIS if you stated in more detail why the following list was chosen and not a broader list of injured resources. Provide your explanation or rationale before the list, i.e. refer to what's on p. 18-19 here also.

Chapter 2 - Alternatives, Including the Proposed Action

p.2. In General Restoration paragraph, last line, change "the" to "they". For Monitoring and Research, I believe the "ecosystem monitoring" you refer to should be changed to "recovery monitoring". The Trustees are not proposing an ecosystem monitoring program per se, and such a statement is misleading.

p.6. Figures 2-1 through 2-3. Will these be in color in the DEIS? It is very difficult to distinguish land-ownership from the gray shades.

p. 10. "Alternative 5" paragraph - should we not mention "enhancement" here? I am uncomfortable with the choice of words "encourages appropriate new uses" and suggest you say "allows for .."

p. 12. Under "Birds - Clean Mussel Beds", the statement is false. NPS has studied mussel beds outside PWS. Restrict statement to the "60 beds in PWS".

p. 12. Also, under Recreation, what is the difference between the first two items? I suggest "Improve existing recreation opportunities" is sufficient for both.

Chapter 3 - Affected Environment

p. 1. Under "summarizes injury", strike "birds", insert "biological resources".

p. 4. 1st para. - Include "river outflow" as reason for low salinity in PWS and Cook Inlet. KAK

p.4, 3rd para. - strike "mackerel" and capitalize "Tanner". KAK

Chapter 4 - Environmental Consequences

p. 1., para. 1 - I suggest you underline "increases" in the last sentence to emphasize this point.

p. 2. What happened to a "Marine Mammals" section here? I suggest there should be one. KAK or Jim

p. 4, para. 4 - Strike "in" in first line.

p. 5, Table 4-1. This table really needs further description in the caption. Is this per year? For how many years? How were the amounts per category determined? For example, Alternative 5 shows $1,000K for administration, $329K for restoration reserve, etc. Where did these amounts come from? Even the totals seem odd. Alternative 5 totals about $45,000K, Alternative 4 totals about $53,000K. Appendix D doesn't really clarify this and Jim

Appendix D is short enough that the explanation there could be included in Chapter 4 preceding the Table 4-1. Frankly, if we can't understand this information, how will the public.?

Chapter 6 - Consultation and Coordination

p. 7. Unbold the first line of cities.

p. 8. We would like to review these lists before printing.

Appendix E - Status Report

p. 19. "Murres Damage Assessment Closeout" belongs on p. 2.

Karen - Here's what I've scribbled on your sections (earlier version). Mostly stuff to shorten, but some technical. For what it's worth . . .

Jerry

E
EIS

Alternative 3: Limited Restoration

Introduction

In this alternative, the general restoration program focuses only on the components of the ecosystem that were most injured by the oil spill. General restoration actions are sometimes able to help resources or services recover to their prespill conditions more rapidly than if the actions were not implemented. The general restoration program would be limited to the most effective actions in order to maximize the available funds for habitat protection activities. Habitat protection and acquisition can provide protective benefits to all resources and services injured by the spill as well as to other resources and human uses that are important to the greater EVOS ecosystem. Increasing the protection of habitat throughout the oil spill area will be beneficial to the entire ecosystem by reducing further habitat degradation that may compound the effects of the oil spill. The Monitoring and Research program would evaluate the effectiveness of restoration actions and follow the recovery progress of the injured resources and services.

Impacts on Biological Resources

Impacts on Intertidal Resources

There are three actions that affect the intertidal zone that have been identified for this alternative, habitat protection, accelerating the recovery of *Fucus* in the upper intertidal zone, and cleaning oiled mussel beds.

for alt 3 only?

Habitat Protection and Acquisition. Although there are several types of actions that apply under this restoration category, this analysis only considers the types of benefits that may be gained from protecting the 81 upland parcels identified in the Comprehensive Habitat Protection Process: Large Parcel Evaluation & Ranking Volume I and II (EVOS Restoration Team, November 1993). Other aspects, such as the small parcels available for protection, of the habitat protection category are still being developed and cannot be analyzed in this DEIS.

3. only 62 for alt 3

The Habitat Protection process used to evaluate the 81 parcels for their potential benefits to injured resources and services combined intertidal and subtidal biota and used the following criteria for ranking the parcels:

- "High" for parcels adjacent to areas with a known high species abundance and diversity; high quality habitat for intertidal and subtidal biota;
- "Moderate" for parcels adjacent to extensive intertidal habitat with observed or probable moderate species diversity and abundance; and,
- "Low" for parcels with little intertidal habitat with low species abundance (EVOS Restoration Team, November 1993).

do I misunderstand something? I count only 62 parcels for alt 3 ??!!

Of the 81 parcels evaluated using these criteria, 25 of the parcels were ranked "High", 33 were ranked "Moderate", 19 were ranked "Low" and 4 were not associated with the coastline

and had no rating for intertidal/subtidal organisms (EVOS Restoration Team, November 1993). If a higher cost per acre is assumed for the protection of these parcels, fewer of the parcels that were ranked "Low" in the overall ranking for multiple resources and services are likely to be protected. Because most of these parcels were also evaluated as being of "Low" benefit to intertidal/subtidal, the differences between the more restrictive list and the total list are minimal.

The benefits to intertidal and subtidal organisms through the protection of upland habitats comes in two forms. First, protection can prevent the intertidal and subtidal areas from being altered by the actions that may occur on the parcels. Some actions can cause indirect adverse effects through siltation, or increased pollution, while other actions such as the construction of a dock or creating a new harbor, could directly alter the intertidal and subtidal habitats. The second type of protection reduces the disturbance caused by increased human activity (e.g. more people walking through the intertidal area; more pollution from littering or from bilge discharge). Obviously, the type of activity that may occur on a given parcel can substantially change the degree of benefit that is gained from protecting upland parcels adjacent to the intertidal and subtidal zones.

The overall benefit from protecting most or all of the 81 parcels identified in the large parcel process is "Moderate" based on the evaluation criteria, but the actual benefit gained by the intertidal and subtidal organisms depends on the type and location of the activities that may occur. In areas where construction activities are anticipated in the intertidal zone, the protection would be especially effective. If the parcels correspond to areas of the intertidal zone that are still not recovering from the effects of the oil spill, the benefits could be even greater.

The other two actions that have been identified for this alternative can directly affect the intertidal zone. These actions affect specific organisms, *Fucus* and mussels, but are meant to provide broader benefits to the other organisms that live or feed in these communities.

Accelerate the recovery of the upper intertidal zone by re-establishing *Fucus*. The upper intertidal area, specifically the upper 1 meter vertical drop (1MVD), is probably the upper extent of suitable habitat for *Fucus* to grow. This means that the conditions are more extreme than in other habitats and would be more difficult to colonize. *Fucus* germlings that colonize in the upper intertidal area are subject longer periods of high temperatures and dryness during low tides. Without the shelter and moisture that is provided by adult *Fucus* plants the germlings can become desiccated and die. Studies conducted in Herring Bay, PWS, suggest that it may take 3 to 4 years for *Fucus* communities to expand 0.5m beyond their existing boundaries (Highsmith et al, October 1993).

Feasibility studies of techniques for accelerating the recovery of *Fucus* were begun in 1992. Attempts to transplant adult *Fucus* plants were generally unsuccessful (Stekoll pers comm. 4/8/94). Another technique which uses a biodegradable cloth to cover seeded areas is currently being tested (Stekoll, pers comm. 4/8/94). The results of this experiment will be known during the summer of 1994. In theory, the cloth will substitute for the adult *Fucus* by providing moisture and protection to the germlings during low tides. Because the technique is still being tested it is impossible to know how successful the action may be, or how easily it can be applied to the areas that could benefit from the action. If the technique is highly successful, the established germlings could become fully mature plants in 3-4 years and the associated invertebrates will also recolonize in the upper intertidal zone. At this time,

However, it is impossible to know the outcome of the research ~~therefore any~~ benefits ~~from this action~~ are unknown.

Cleaning oiled mussel beds has been considered as a possible method to reduce the hydrocarbon exposure for sea otters, harlequin ducks, and black oystercatchers. These animals depend on mussels for a large portion of their diet (Doroff and Bodkin, 1993). Mussels can be found in loose aggregations attached to intertidal rocks, or they can be found in dense aggregations (mussel beds) over pea gravel and silt sediments. Because mussels form a dense matt over the sediments and rocks, oil that was trapped beneath the mussels was not exposed to weathering and still remains toxic. It may be possible to clean mussels in mussel beds, but there are areas where it will be technically infeasible to remove the remaining oil.

~~One of the~~ possible explanations ~~of the~~ continuing signs of injury to sea otters, river otters, harlequin ducks and black oystercatchers is that they ~~are continuing~~ to be exposed to hydrocarbon contamination by eating oiled mussels. Concern over this possible continuing source of contamination led to feasibility studies to develop techniques to clean the sediments beneath the oiled mussel beds. One technique that will be tested in 1994, lifts sections of the mussel beds and replaces the contaminated sediments with clean sediments without serious damage to the mussel beds (Bodkin, pers comm.). Other techniques are likely to damage the existing mussels ~~in order to remove the~~ contaminated sediments. Approximately 60 locations with oiled mussel beds have been identified in PWS.

The extent and distribution of oiled mussel beds is still being determined and will be important in understanding the potential benefits that can be gained for other organisms by this action. There have been no studies to determine whether or not eating contaminated mussels is causing injury to other animals. The intent of cleaning oiled mussel beds is largely to eliminate a source of continuing contamination to other organisms. Studies which examined the effects of oil on the mussel beds noted a reduction in the number of large mussels and overall biomass of the mussel beds, but there did not appear to be a shortage of new recruits (smaller mussels) to the mussel beds (Highsmith et al, December 1993). It is unknown if the trapped oil beneath the mussel beds will ultimately cause further injury to the mussels; however, continued high levels of hydrocarbons have been found in mussel tissues which indicates that the mussels may be continuing to be contaminated.

~~If techniques are developed to clean the oiled sediments without destroying a large amount of the mussel beds~~ then this action is unlikely to cause an adverse effect, and may provide tangible benefits to the mussels at the cleaned sites. ~~It is reasonable to assume that the ability of this action to reduce the level of contamination beneath mussel beds is valid in all regions of the spill area.~~ However, there is less information on the location of oiled mussel beds ~~in areas~~ outside of PWS.

Conclusions

- Short term benefits: Negligible.
- Long term benefits: For direct restoration actions are unknown because both of these actions are still being tested. The long term benefits of the Habitat Protection actions for reducing disturbance or preventing additional injury to intertidal organisms are moderate and will vary substantially between parcels.

Harbor Seals

The greatest way to benefit the injured harbor seal populations is to determine what has caused the long term decline of populations throughout the Gulf of Alaska. Such research activities cannot be analyzed in this DEIS because the environmental effects are dependent on the outcome of the research and how the results can be used for restoration. For this analysis we can only consider the effects of habitat protection and the two types of General Restoration Actions proposed in Chapter 2. Both of the proposed actions are information based programs that would be designed to change the impact of commercial fisheries or of subsistence harvest on the recovering seal populations.

Subsistence harvest is not believed to be the cause of the long term decline of harbor seal populations in the Gulf of Alaska; however, any ~~additional~~ mortality may slow the recovery of injured populations. Subsistence harvest in PWS declined as a result of the oil spill and in 1991 harvest levels were probably less than 5 percent of the population. A healthy seal population would be able to easily sustain that level of harvest. Depending on the distribution, sex and age of the animals harvested, a 5 percent harvest could negatively affect an injured population.

One of the proposed actions would establish a cooperative program between subsistence users and research scientists or agency managers. The program would be designed to provide a two-way exchange of information that would provide benefits to all ~~sides~~ and could benefit the injured harbor seal populations. For example, recent studies indicated that harbor seals may have a high site fidelity to molting and pupping areas (e.g. the same individuals consistently use the same areas) (Pitcher 1990). If some of these areas show greater declines than other sites within PWS, then redirecting harvest towards the healthier, or the nonoiled areas could reduce any negative effects from the harvest without actually changing the number of animals harvested.

A similar cooperative program with commercial fishermen could also reduce pressure on the injured seal populations. This program would provide information on deterrent methods and regulations. Ideally it would provide information to the scientists on the extent of the interactions between the commercial fisheries and the seals, and would reduce the number of seal mortalities. The interactions with commercial fisheries probably result in fewer deaths than from the subsistence harvest and is unlikely to be the cause of the seal decline; however, the more that can be done to minimize the effects of human caused injury and mortality, the more likely it will be that the population will stabilize and recover.

Habitat Protection of upland parcels. Harbor seals use haulout sites that are either in the intertidal zone, or immediately adjacent to the intertidal zone; therefore, actions that occur on the upland are not likely to destroy the habitat. However, it is possible that habitat changes to the uplands may increase the amount of disturbance currently experienced at haulout sites on or near the parcel. Disturbance ~~has been documented as~~ adversely affecting harbor seals and other pinnipeds in other parts of their range (Allen, et al. 1984; Esipenko, 1986; Johnson, et al. 1989). These studies have shown that the greatest impacts from disturbances are at haulout sites during pupping and molting. During pupping, disturbance can result in higher pup mortality caused by abandonment, or from being crushed as the adults panic and return to the water (Johnson, 1977). The greatest disturbance is caused when people walk near or through haulout sites (Johnson, et al. 1989), but disturbance can also be caused by low flying aircraft and by boats that approach too close to the haulouts.

Habitat protection criteria for parcels that may benefit harbor seals include ratings of:

- "High" for parcels known to have a haulout of 10 or more seals on or immediately adjacent to the parcel;
- "Moderate" for parcels with known haulouts with sporadic use and less than 10 seals; or, probable haulouts in vicinity of the parcel; or probable feeding in nearshore waters; and,
- "Low" for possible feeding sites located in nearshore waters adjacent to the parcel (EVOS Restoration Team, November 1993).

Of the 81 parcels evaluated in the large parcel process, 25 of the parcels were ranked "High", 19 of the parcels were ranked "Moderate", 35 were ranked "Low" and 2 parcels were ranked as having no benefit to harbor seals. The overall value of these parcels, based on these rankings, is "moderate", although individual parcels may have exceptional value. If a higher cost per acre is assumed for the protection of these parcels, fewer of the parcels that are ranked "Low" for multiple resources and services are likely to be protected. Under this scenario there would be limited effect on the benefits to harbor seals because most highly or moderately ranked parcels are still included.

The actual impact that development on these parcels will have on the harbor seals depends on, among other things, the type of disturbance caused, the length and duration of the disturbance, and whether or not the haulout area is used for pupping or molting. Within the EVOS area, there have been no studies to document the amount or effects of current activities that may cause disturbance to harbor seals so baseline data are unavailable. However, it is reasonable to assume that protection of upland habitats near haulout sites will reduce the risk of disturbance to the injured population.

Aside from monitoring and research activities, and assuming that the actions previously described are implemented, none of the other actions proposed under this alternative for other resources or services are likely to impact harbor seals.

Conclusions

Short-term benefits: Negligible . All of the proposed actions require some time after implementation before any changes could be expected.

Long-term benefits: Moderate. The proposed actions could reduce negative impacts on harbor seals, and may result in increased recovery rates in local areas.

Sea Otters

There are three types of actions aside from Research or Monitoring that are considered in this alternative: habitat acquisition, cleaning oiled mussel beds, and creating a cooperative program between subsistence users and sea otter scientists and managers.

Habitat protection. The benefit to sea otters of habitat protection actions on upland parcels is through reducing potential or actual disturbance. Sea otters appear to have a high tolerance to certain human activities, as evidenced by their abundance in highly travelled

areas such as Orca Inlet near Cordova; however, their response to large-scale disturbances has not been studied. Large-scale disturbances, such as log-transfer sites, may force resident otters to leave the immediate area and may cause a long-term change in food availability as debris from the logs cover the substrate(). Disturbance is more likely to cause adverse effects to females with pups that concentrate in high quality habitats with abundant prey in the intertidal zones.

Habitat protection criteria for parcels that may benefit sea otters include ratings of:

- "High" for parcels adjacent to known pupping concentrations;
- "Moderate" for parcels adjacent to concentration areas for feeding and/or shelter; or, potential pupping areas; and,
- "Low" for feeding sites located in adjacent waters (EVOS Restoration Team, November 1993).

Of the 81 parcels evaluated in the large parcel process, 20 of the parcels were ranked "High", 16 of the parcels were ranked "Moderate", 42 were ranked "Low" and 3 parcels were ranked as having no benefit to sea otters. The overall value of these parcels, based on these rankings, is "low to moderate", although individual parcels may be near habitat of exceptional value. If a higher cost per acre is assumed for the protection of these parcels, fewer of the parcels that are ranked "Low" for multiple resources and services are likely to be protected. Because most of these parcels were also evaluated as being of "Low" benefit to sea otters, the differences in the potential benefit to sea otters would change very little because most highly or moderately ranked parcels are still included.

Cleaning oiled mussel beds has been considered as a possible method to reduce the hydrocarbon exposure. Sea otters, especially juvenile otters and females with pups, depend on mussels for a large portion of their diet (Doroff and Bodkin, 1993). Mussels are found in shallower areas and are easier to obtain than other prey. Mussels can be found in loose aggregations attached to intertidal rocks, or they can be found in dense aggregations (mussel beds) over pea gravel and silt sediments. Because mussels form a dense matt over the sediments and rocks, oil that was trapped beneath the mussels was not exposed to weathering and still remains toxic. It may be possible to clean mussels in mussel beds, but there are areas where it will be technically infeasible to remove the remaining oil. One of the possible explanations of the poor survival rate of post-weanling juveniles in the oiled areas is that they are continuing to be exposed to hydrocarbon contamination by eating oiled mussels. Concern over the possible continuing source of contaminations to otters and other higher order animals (e.g. black oystercatchers and harlequin ducks) led to feasibility studies to develop techniques to clean the sediments beneath the oiled mussel beds. One technique that will be tested in 1994, lifts sections of the mussel beds and replaces the contaminated sediments with clean sediments without serious damage to the mussel beds (Babcock pers. comm.). Approximately 60 locations with oiled mussel beds have been identified in PWS.

The extent and distribution of oiled mussel beds is still being determined and will be important in understanding the potential benefit to sea otters that can be gained from cleaning. There have been no studies to determine whether or not eating contaminated mussels is causing injury to the sea otter population. However, it is possible to consider the potential benefit in terms of the level of risk to exposure. For example, the telemetry study

by Monnett and Rotterman (1992) indicated that females and weanling otters did not range great distances between oiled and unoiled areas. If a group of otters spends many months feeding in bays that have several oiled mussel beds, then they are at greater risk of exposure than otters that feed in areas with few or no oiled mussels. Of the oiled mussel beds identified so far, there are approximately 20 in Herring Bay off of Knight Island; cleaning half or all of these mussel beds would greatly reduce the risk to the local population. If only 1 or 2 beds in the area were cleaned, it may not reduce the risk of exposure at all. Similarly, if the only source of oil in an entire bay was from one mussel bed, removing that contamination could eliminate the majority of the risk to the local otters.

Cleaning oiled mussel beds is likely to be a labor intensive task that may last for several days at each location. Some short term disturbance is likely to occur; however, it is not likely to permanently displace the local otters.

It is reasonable to assume that the ability of this action to reduce the risk of exposure is equally valid in other regions of the spill area. However, there is less information on the location of mussel beds and on the injury to the sea otter population.

Should fact that SEOT populations in PWS have been increasing steadily past 10-15 yrs → be factored in? some fishermen (crab) were complaining of too many SEOT depleting crab stocks year before the spill.

Establishing a cooperative program between subsistence users and research scientists or agency managers is another action that is appropriate under this alternative. The program would be designed to provide a two-way exchange of information that would provide benefits to all sides and could benefit the injured sea otter population. Recent records of subsistence harvest of sea otters the oil spill area indicate that harvest levels are relatively low but increasing throughout the EVOS area. If subsistence levels increase in areas where the populations were affected by the spill, the additional harvest may slow or prevent localized recovery. For example, the densities of otters in some oiled areas is still very low (Bodkin and Ballachey, pers comm) if these areas are consistently harvested, then redirecting harvest towards the healthier, or the nonoiled areas could reduce any negative effects without actually changing the number of animals harvested. Likewise, sea otters can sustain a greater harvest of males and juveniles than of breeding females.

Without any restoration actions, it may be reasonable to estimate that sea otters in PWS will recover to their prespill abundance in 7 to 35 years once the population begins to increase. If subsistence harvest rates rise substantially in the oiled areas, then the recovery estimates based on a 10 percent growth rate are unlikely and it is possible that the more conservative estimate of 35 years would be extended. If a cooperative program can be established, it may be possible to sustain a higher harvest rate, without changing the recovery rate of the injured population.

Actions implemented for other resources or services are not expected to impact the sea otter populations or their recovery.

Conclusions

Short term effects: Negligible. All of the proposed actions will take time before any results could be expected.

Long term effects: Moderate. The proposed actions improve the habitat quality through reducing the risk of exposure to oil, the potential for disturbance, and the impacts from

Alternative 4: Moderate Restoration

Introduction

This Alternative broadens the general restoration program to include all resources with documented injuries from the oil spill. It differs from Alternative 3 by addressing injured resources whose populations did not decline as a result of the spill. This alternative also allows for settlement funds to be used outside of the spill area, and allows for increasing opportunities for human uses of the area. This alternative also encourages using only the most effective restoration measures for general restoration actions.

A large part of this alternative is dedicated to habitat protection and acquisition which provides protective benefits to all resources and services injured by the oil spill as well as to other resources and human uses that are important to the greater EVOS ecosystem. Increasing the protection of habitat throughout the spill area will be beneficial to the entire ecosystem by reducing further habitat degradation that may compound the effects of the oil spill. The general restoration actions can help resources or services recover to their prespill conditions more rapidly than if the actions were not implemented. A third component of the restoration program is Monitoring and Research. These activities track the progress of recovery and provide valuable information that can be used to help the resources, and the overall ecosystem, recover from the oil spill and from other factors that may be delaying recovery.

Impacts on Biological Resources

Impacts on Intertidal Resources

There are three actions that affect the intertidal zone that have been identified for this alternative, habitat protection, accelerating the recovery of *Fucus* in the upper intertidal zone, and cleaning oiled mussel beds. This alternative differs from Alternative 3 only in the more restrictive scenario of the habitat protection opportunity.

Habitat Protection and Acquisition. Although there are several types of actions that apply under this restoration category, this analysis only considers the types of benefits that may be gained from protecting the 81 upland parcels identified in the Comprehensive Habitat Protection Process; Large Parcel Evaluation & Ranking Volume I and II (EVOS Restoration Team, November 1993). Other aspects, such as the small parcels available for protection, of the habitat protection category are still being developed and cannot be analyzed in this DEIS.

The Habitat Protection process used to evaluated the 81 parcels for their potential benefits to injured resources and services combined intertidal and subtidal biota and used the following criteria for ranking the parcels:

- "High" for parcels adjacent to areas with a known high species abundance and diversity; high quality habitat for intertidal and subtidal biota;

- "Moderate" for parcels adjacent to extensive intertidal habitat with observed or probable moderate species diversity and abundance; and,

- "Low" for parcels with little intertidal habitat with low species abundance (EVOS Restoration Team, November 1993).

In alternative 4, it is possible to protect all of the 81 parcels if it is assumed that the cost per acre is inexpensive. If a higher cost per acre is assumed for the protection of these parcels, fewer of the parcels that were ranked "Low" in the overall ranking for multiple resources and services are likely to be protected. Under this scenario, the potential benefit would change from 25 to 19 parcels ranked "High", from 33 to 10 parcels ranked "Moderate", and 19 to 4 parcels ranked "Low".

The benefits to intertidal and subtidal organisms through the protection of upland habitats comes in two forms. First, the protection can prevent the intertidal and subtidal areas from being altered by the actions that may occur on the parcels. Some actions can cause indirect adverse effects through siltation, or increased pollution, while other actions such as the construction of a dock or creating a new harbor, could directly alter the intertidal and subtidal habitats. The second type of protection reduces the disturbance caused by increased human activity (e.g. more people walking through the intertidal area; more pollution from littering or from bilge discharge). Obviously, the type of activity that may occur on a given parcel can substantially change the degree of benefit that is gained to the intertidal and subtidal zones.

The overall benefit from protecting most or all of the 81 parcels identified in the large parcel process is "Moderate" (based on the evaluation criteria) but the actual benefit gained by the intertidal and subtidal organisms depends on the type and location of the activities that may occur. In areas where construction activities are anticipated in the intertidal zone, the protection would be especially effective. If the parcels correspond to areas of the intertidal zone that are still not recovering from the effects of the oil spill, the benefits could be even greater.

The other two actions that have been identified for this alternative can directly affect the intertidal zone. These actions affect specific organisms, *Fucus* and mussels, but are meant to provide broader benefits to the other organisms that live or feed in these communities.

Accelerate the recovery of the upper intertidal zone by re-establishing *Fucus*. The upper intertidal area, specifically the upper 1 meter vertical drop (1MVD), is probably the upper extent of suitable habitat for *Fucus* to grow. This means that the conditions are more extreme than in other habitats and would be more difficult to colonize. *Fucus* germlings that colonize in the upper intertidal area are subject longer periods of high temperatures and dryness during low tides. Without the shelter and moisture that is provided by adult *Fucus* plants the germlings can become desiccated and die. Studies conducted in Herring Bay, PWS, suggest that it may take 3 to 4 years for *Fucus* communities to expand 0.5m beyond their existing boundaries (Highsmith et al, October 1993).

Feasibility studies of techniques for accelerating the recovery of *Fucus* were begun in 1992. Attempts to transplant adult *Fucus* plants were generally unsuccessful (Stekoll pers comm. 4/8/94). Another technique which uses a biodegradable cloth to cover seeded areas is currently being tested (Stekoll, pers comm. 4/8/94). The results of this experiment will be known during the summer of 1994. In theory, the cloth will substitute for the adult *Fucus* by providing moisture and protection to the germlings during low tides. Because the technique is still being tested it is impossible to know how successful the action may be or how easily it can be applied to the areas that could benefit from the action. If the technique is highly successful, the established germlings could become fully mature plants in 3-4 years and the

associated invertebrates will also recolonize in the upper intertidal zone. At this time, however, it is impossible to know the outcome of the research therefore any benefits from this action are unknown.

Cleaning oiled mussel beds has been considered as a possible method to reduce the hydrocarbon exposure for sea otters, harlequin ducks, and black oystercatchers. These animals depend on mussels for a large portion of their diet (Doroff and Bodkin, 1993). Mussels can be found in loose aggregations attached to intertidal rocks, or they can be found in dense aggregations (mussel beds) over pea gravel and silt sediments. Because mussels form a dense matt over the sediments and rocks, oil that was trapped beneath the mussels was not exposed to weathering and still remains toxic. It may be possible to clean mussels in mussel beds, but there are areas where it will be technically infeasible to remove the remaining oil.

One of the possible explanations of the continuing signs of injury to sea otters, river otters, harlequin ducks and black oystercatchers is that they are continuing to be exposed to hydrocarbon contamination by eating oiled mussels. Concern over this possible continuing source of contaminations led to feasibility studies to develop techniques to clean the sediments beneath the oiled mussel beds. One technique that will be tested in 1994, lifts sections of the mussel beds and replaces the contaminated sediments with clean sediments without serious damage to the mussel beds (Bodkin, pers comm.). Other techniques are likely to damage the existing mussels in order to remove the contaminated sediments. Approximately 60 locations with oiled mussel beds have been identified in PWS.

The extent and distribution of oiled mussel beds is still being determined and will be important in understanding the potential benefits that can be gained for other organisms by this action. There have been no studies to determine whether or not eating contaminated mussels is causing injury to other animals. The intent of cleaning oiled mussel beds is largely to eliminate a source of continuing contamination to other organisms. Studies which examined the effects of oil on the mussel beds noted a reduction in the number of large mussels and overall biomass of the mussel beds, but there did not appear to be a shortage of new recruits (smaller mussels) to the mussel beds (Highsmith et al, December 1993). It is unknown if the trapped oil beneath the mussel beds will ultimately cause further injury to the mussels; however, continued high levels of hydrocarbons have been found in mussel tissues which indicates that the mussels may be continuing to be contaminated.

If techniques are developed to clean the oiled sediments without destroying a large amount of the mussel beds then this action is unlikely to cause an adverse effect, and may provide tangible benefits to the mussels at the cleaned sites. It is reasonable to assume that the ability of this action to reduce the level of contamination beneath mussel beds is valid in all regions of the spill area. However, there is less information on the location of oiled mussel beds in areas outside of PWS.

Conclusions

- Short term benefits: Negligible.

- Long term benefits: For direct restoration actions are unknown because both of these actions are still being tested. The long term benefits of the Habitat Protection actions for

reducing disturbance or preventing additional injury to intertidal organisms are moderate and will vary substantially between parcels.

Marine Mammals

Harbor Seals

The restoration program for harbor seals under Alternative 4 is very similar to the program discussed in Alternative 3. This alternative differs in two manners, the Habitat Protection capabilities may differ if when the higher cost per acre is considered; and actions proposed that increase the number of people using an area can increase the potential for disturbance.

The greatest way to benefit the injured harbor seal populations is to determine what has caused the long term decline of populations throughout the Gulf of Alaska. Such research activities cannot be analyzed in this DEIS because the environmental effects are dependent on the outcome of the research and how the results can be used for restoration. For this analysis we can only consider the effects of habitat protection and the two types of General Restoration Actions proposed in Chapter 2. Both of the proposed actions are information based programs that would be designed to change the impact of commercial fisheries or of subsistence harvest on the recovering seal populations.

Subsistence harvest is not believed to be the cause of the long term decline of harbor seal populations in the Gulf of Alaska; however, any additional mortality may slow the recovery of injured populations. Subsistence harvest in PWS declined as a result of the oil spill and in 1991 harvest levels were probably less than 5 percent of the population. A healthy seal population would be able to easily sustain that level of harvest. Depending on the distribution, sex and age of the animals harvested, a 5 percent harvest could negatively affect an injured population.

One of the proposed actions would establish a cooperative program between subsistence users and research scientists or agency managers. The program would be designed to provide a two-way exchange of information that would provide benefits to all sides and could benefit the injured harbor seal populations. For example, recent studies indicated that harbor seals may have a high site fidelity to molting and pupping areas (e.g. the same individuals consistently use the same areas) (Pitcher 1990). If some of these areas show greater declines than other sites within PWS, then redirecting harvest towards the healthier, or the nonoiled areas could reduce any negative effects from the harvest without actually changing the number of animals harvested.

A similar cooperative program with commercial fishermen could also reduce pressure on the injured seal populations. This program would provide information on deterrent methods and regulations. Ideally it would provide information to the scientists on the extent of the interactions between the commercial fisheries and the seals, and would reduce the number of seal mortalities. The interactions with commercial fisheries probably result in fewer deaths than from the subsistence harvest and is unlikely to be the cause of the seal decline; however, the more that can be done to minimize the effects of human caused injury and mortality, the more likely it will be that the population will stabilize and recover.

Habitat Protection of upland parcels. Harbor seals use haulout sites that are either in the intertidal zone, or immediately adjacent to the intertidal zone; therefore, actions that occur on the upland are not likely to destroy the habitat. However, it is possible that habitat changes to

the uplands may increase the amount of disturbance currently experienced at haulout sites on or near the parcel. Disturbance has been documented as adversely affecting harbor seals and other pinnipeds in other parts of their range (Allen, et al. 1984; Esipenko, 1986; Johnson, et al. 1989). These studies have shown that the greatest impacts from disturbances are at haulout sites during pupping and molting. During pupping, disturbance can result in higher pup mortality caused by abandonment, or from being crushed as the adults panic and return to the water (Johnson, 1977). The greatest disturbance is caused when people walk near or through haulout sites (Johnson, et al. 1989), but disturbance can also be caused by low flying aircraft and by boats that approach too close to the haulouts.

Habitat protection criteria for parcels that may benefit harbor seals include ratings of:

- "High" for parcels known to have a haulout of 10 or more seals on or immediately adjacent to the parcel;

- "Moderate" for parcels with known haulouts with sporadic use and less than 10 seals; or, probable haulouts in vicinity of the parcel; or probable feeding in nearshore waters; and,

- "Low" for possible feeding sites located in nearshore waters adjacent to the parcel (EVOS Restoration Team, November 1993).

Of the 81 parcels evaluated in the large parcel process, 25 of the parcels were ranked "High", 19 of the parcels were ranked "Moderate", 35 were ranked "Low" and 2 parcels were ranked as having no benefit to harbor seals. The overall value of these parcels, based on these rankings, is "moderate", although individual parcels may have exceptional value.

In alternative 4, it is possible to consider the value of all 81 parcels if it is assumed that the cost per acre is inexpensive, however, if the cost per acre is higher fewer acres of land are likely to be purchased. If a higher cost per acre is assumed for the protection of these parcels, fewer of the parcels that are ranked "Low" for multiple resources and services are likely to be protected. Under this scenario the potential benefit to harbor seals would change from 25 to 18 parcels ranked "High", from 19 to 6 parcels ranked "Moderate", and from 35 to 6 parcels ranked "Low".

The actual impact that development on these parcels will have on the harbor seals depends on, among other things, the type of disturbance caused, the length and duration of the disturbance, and whether or not the haulout area is used for pupping or molting. Within the EVOS area, there have been no studies to document the amount or effects of current activities that may cause disturbance to harbor seals so baseline data are unavailable. However, it is reasonable to assume that protection of upland habitats near haulout sites will reduce the risk of disturbance to the injured population.

Restoration actions for other resources/services. If actions are taken to increase recreation and commercial tourism activities, or construct large facilities such as hatcheries, in the oil spill area, careful site selection away from key haulout areas could avoid a long term impact on harbor seals.

Conclusions.
Short-term benefits: Negligible . All of the proposed actions require some time after implementation before any changes could be expected.

Long-term benefits: Moderate. The proposed actions could reduce negative impacts on harbor seals, and may result in increased recovery rates in local areas.

Sea Otters

The effects of actions under Alternative 4 are expected to be identical to those described in Alternative 3 with the exception of the amount of habitat that can be protected.

There are three types of actions aside from Research or Monitoring that are considered in this alternative: habitat acquisition, cleaning oiled mussel beds, and creating a cooperative program between subsistence users and sea otter scientists and managers.

Habitat protection. The benefit to sea otters of habitat protection actions on upland parcels is through reducing potential or actual disturbance. Sea otters appear to have a high tolerance to certain human activities, as evidenced by their abundance in highly travelled areas such as Orca Inlet near Cordova; however, their response to large-scale disturbances has not been studied. Large-scale disturbances, such as log-transfer sites, may force resident otters to leave the immediate area and may cause a long-term change in food availability as debris from the logs cover the substrate(). Disturbance is more likely to cause adverse effects to females with pups that concentrate in high quality habitats with abundant prey in the intertidal zones.

Habitat protection criteria for parcels that may benefit sea otters include ratings of:
- "High" for parcels adjacent to known pupping concentrations;
- "Moderate" for parcels adjacent to concentration areas for feeding and/or shelter; or, potential pupping areas; and,
- "Low" for feeding sites located in adjacent waters (EVOS Restoration Team, November 1993).

Of the 81 parcels evaluated in the large parcel process, 20 of the parcels were ranked "High", 16 of the parcels were ranked "Moderate", 42 were ranked "Low" and 3 parcels were ranked as having no benefit to sea otters. The overall value of these parcels, based on these rankings, is "low to moderate", although individual parcels may be near habitat of exceptional value.

In alternative 4, it is possible to consider the value of all 81 parcels if it is assumed that the cost per acre is inexpensive, however, if the cost per acre is higher fewer acres of land are likely to be purchased. If a higher cost per acre is assumed for the protection of these parcels, fewer of the parcels that are ranked "Low" for multiple resources and services are likely to be protected. Under this scenario the potential benefit to sea otters would change from 20 to 14 parcels ranked "High", from 16 to 8 parcels ranked "Moderate", and from 42 to 10 parcels ranked "Low".

Cleaning oiled mussel beds has been considered as a possible method to reduce the hydrocarbon exposure. Sea otters, especially juvenile otters and females with pups, depend

on mussels for a large portion of their diet (Doroff and Bodkin, 1993). Mussels are found in shallower areas and are easier to obtain than other prey. Mussels can be found in loose aggregations attached to intertidal rocks, or they can be found in dense aggregations (mussel beds) over pea gravel and silt sediments. Because mussels form a dense matt over the sediments and rocks, oil that was trapped beneath the mussels was not exposed to weathering and still remains toxic. It may be possible to clean mussels in mussel beds, but there are areas where it will be technically infeasible to remove the remaining oil.

One of the possible explanations of the poor survival rate of post-weanling juveniles in the oiled areas is that they are continuing to be exposed to hydrocarbon contamination by eating oiled mussels. Concern over the possible continuing source of contaminations to otters and other higher order animals (e.g. black oystercatchers and harlequin ducks) led to feasibility studies to develop techniques to clean the sediments beneath the oiled mussel beds. One technique that will be tested in 1994, lifts sections of the mussel beds and replaces the contaminated sediments with clean sediments without serious damage to the mussel beds(Babcock, pers. comm.). Approximately 60 locations with oiled mussel beds have been identified in PWS.

The extent and distribution of oiled mussel beds is still being determined and will be important in understanding the potential benefit to sea otters that can be gained from cleaning. There have been no studies to determine whether or not eating contaminated mussels is causing injury to the sea otter population. However, it is possible to consider the potential benefit in terms of the level of risk to exposure. For example, the telemetry study by Monnett and Rotterman (1992) indicated that females and weanling otters did not range great distances between oiled and unoiled areas. If a group of otters spends many months feeding in bays that have several oiled mussel beds, then they are at greater risk of exposure than otters that feed in areas with few or no oiled mussels. Of the oiled mussel beds identified so far, there are approximately 20 in Herring Bay ~~off of~~ at Knight Island; cleaning half or all of these mussel beds would greatly reduce the risk to the local population. If only 1 or 2 beds in the area were cleaned, it may not reduce the risk of exposure at all. Similarly, if the only source of oil in an entire bay was from one mussel bed, removing that contamination could eliminate the majority of the risk to the local otters.

Cleaning oiled mussel beds is likely to be a labor intensive task that may last for several days at each location. Some short term disturbance is likely to occur; however, it is not likely to permanently displace the local otters.

It is reasonable to assume that the ability of this action to reduce the risk of exposure is ~~equally~~ valid ~~in other regions of~~ outside of PWS in the spill area. However, there is less information on the location of mussel beds and on the injury to the sea otter population.

Establishing a cooperative program between subsistence users and ~~research scientists or~~ agency managers and scientists is another action that is appropriate under this alternative. The program would be designed to provide a two-way exchange of information that would provide benefits to all sides and could benefit the injured sea otter population. Recent records of subsistence harvest of sea otters in the oil spill area indicate that harvest levels are relatively low but increasing ~~throughout the EVOS area.~~ If subsistence levels increase in areas where the populations were affected by the spill, the additional harvest may slow or prevent localized recovery. For example, the densities of otters in some oiled areas is still very low (Bodkin

4 Environmental Consequences

The Proposed Action Alternative 5: Comprehensive Restoration

Introduction

In this alternative, the general restoration program focuses on the status of recovery of injured resources rather than on the degree of injury caused by the oil spill. In this way, the components of the ecosystem that are having most difficulty recovering receive the greatest efforts - if there are general restoration actions that can realistically help. This alternative also increases the opportunity to conduct research into other aspects of the ecosystem that may be influencing the recovery of the resources and services injured by the oil spill.

The habitat protection and acquisition program is a primary component of the overall restoration program, receiving the largest portion of the remaining settlement funds. Habitat protection and acquisition provides protective benefits to all resources and services injured by the oil spill as well as to other resources and human uses that are important to the greater EVOS ecosystem. Increasing the protection of habitat throughout the spill area will be beneficial to the entire ecosystem by reducing further habitat degradation that may compound the effects of the oil spill. The general restoration actions can help resources or services recover to their prespill conditions more rapidly than if the actions were not implemented. A third component of the restoration program is Monitoring and Research. These activities track the progress of recovery and provide valuable information that can be used to help the resources, and the overall ecosystem, recover from the oil spill and from other factors that may be delaying recovery.

Impacts on Biological Resources

Impact on Intertidal Resources

will be self-evident to reader.

In Alternative 5 the restoration program for intertidal resources differs from the previous alternatives by adding an additional action, and by providing three possible scenarios for the Habitat Protection program. These changes are presented at the beginning of the discussion below, followed by the actions that are identical to those described in alternatives 3 and 4.

Habitat Protection and Acquisition. Although there are several types of actions that apply under this restoration category, this analysis only considers the types of benefits that may be gained from protecting the 81 upland parcels identified in the Comprehensive Habitat Protection Process; Large Parcel Evaluation & Ranking Volume I and II (EVOS Restoration Team, November 1993). Other aspects, such as the small parcels available for protection, of the habitat protection category are still being developed and cannot be analyzed in this DEIS.

The Habitat Protection process used to evaluated the 81 parcels for their potential benefits to injured resources and services combined intertidal and subtidal biota and used the following criteria for ranking the parcels:

- "High" for parcels adjacent to areas with a known high species abundance and diversity; high quality habitat for intertidal and subtidal biota;

- "Moderate" for parcels adjacent to extensive intertidal habitat with observed or probable moderate species diversity and abundance; and,

- "Low" for parcels with little intertidal habitat with low species abundance (EVOS Restoration Team, November 1993).

In alternative 5, it is possible to consider the value of all 81 parcels if it is assumed that the cost per acre is inexpensive, however, if the cost per acre is higher fewer acres of land are likely to be purchased. In this alternative there is a range of funds available for Habitat Protection and Acquisition actions, so there are two more restrictive estimates that need to be assessed based on a higher cost per acre. For this analysis, when a higher cost per acre is assumed for the protection of these parcels, fewer of the parcels that are ranked "Low" for multiple resources and services are likely to be protected. Some of these parcels may still have "High" or "Moderate" value for intertidal and subtidal resources, even though their total ranking is "Low" when evaluated for all of the injured resources and services combined. Table 4.XX shows how the distribution of habitat evaluated as "high", "Moderate" or "low" changes for intertidal/subtidal benefits when all 81 parcels are considered or when the parcels are reduced from higher cost and/or less money is dedicated to habitat protection.

Table 4-2
Distribution of Habitat Evaluated

	High Benefits	Moderate Benefits	Low Benefits
All 81 parcels considered (same in all alternatives)	25 parcels	33 parcels	19 parcels
Higher parcel cost with 50% remaining funds	19 parcels	10 parcels	4 parcels
Higher parcel cost with 45% remaining funds	18 parcels	9 parcels	3 parcels

Under the most restrictive scenario, out of the 81 parcels evaluated 72 percent of the parcels ranked "High" for their intertidal/subtidal habitat would still be protected. The benefits to intertidal and subtidal organsims through the protection of upland habitats comes in two forms. First, the protection can prevent the intertidal and subtidal areas from being altered by the actions that may occur on the parcels. Some actions can cause indirect adverse effects through siltation, or increased pollution, while other actions such as the construction of a dock or creating a new harbor, could directly alter the intertidal and subtidal habitats. The second type of protection reduces the disturbance caused by increased human activity (e.g. more people walking through the intertidal area; more pollution from littering or from bilge discharge). Obviously, the type of activity that may occur on a given parcel can substantially change the degree of benefit that is gained to the intertidal and subtidal zones.

The actual benefit gained by the intertidal and subtidal organisms depends on the type and location of the activities that may occur. In areas where construction activities are anticipated

would be designed to provide a two-way exchange of information that would provide benefits to all sides and could benefit the injured sea otter population. Recent records of subsistence harvest of sea otters the oil spill area indicate that harvest levels are relatively low but increasing throughout the EVOS area. If subsistence levels increase in areas where the populations were affected by the spill, the additional harvest may slow or prevent localized recovery. For example, the densities of otters in some oiled areas is still very low (Bodkin and Ballachey, pers comm) if these areas are consistently harvested, then redirecting harvest towards the healthier, or the nonoiled areas could reduce any negative effects without actually changing the number of animals harvested. Likewise, sea otters can sustain a greater harvest of males and juveniles than of breeding females.

Without any restoration actions, it may be reasonable to estimate that sea otters in PWS will recover to their prespill abundance in 7 to 35 years once the population begins to increase. If subsistence harvest rates rise substantially in the oiled areas, then the recovery estimates based on a 10 percent growth rate are unlikely and it is possible that the more conservative estimate of 35 years would be extended. If a cooperative program can be established, it may be possible to sustain a higher harvest rate, without changing the recovery rate of the injured population.

Actions implemented for other resources or services are not expected to impact the sea otter populations or their recovery.

Conclusions.

Short term effects: Negligible. All of the proposed actions will take time before any results could be expected.

Long term effects: Moderate. The proposed actions improve the habitat quality through reducing the risk of exposure to oil, the potential for disturbance, and the impacts from subsistence harvest. These benefits could produce a change in abundance of otters in some areas, but are not likely to produce a notable increase on a regional scale.

Birds

Harlequin Duck

Habitat Protection and Acquisition. Acquiring nesting habitat along streams on forested lands would have the highest benefit for preventing further injury to the harlequin duck population. Such acquisition would maximize protection of the harlequin ducks' reproductive potential, thus fostering recovery to pre EVOS levels. Thirteen of 18 high priority parcels being considered for acquisition have high potential value for nesting by harlequin ducks.

Cleaning Oiled Mussel Beds. Cleaning oiled mussel beds is considered to be a possible means of reducing hydrocarbon exposure to harlequin ducks via their food chain. Mussels, clams, and other bottom prey of harlequin ducks continue to be contaminated by oil still buried within the sediments. The harlequin ducks eat the contaminated prey, thus contaminating their body tissues. Although as yet unproven, this sub-lethal contamination is suspected of interfering with normal reproduction, resulting in few new broods being seen in

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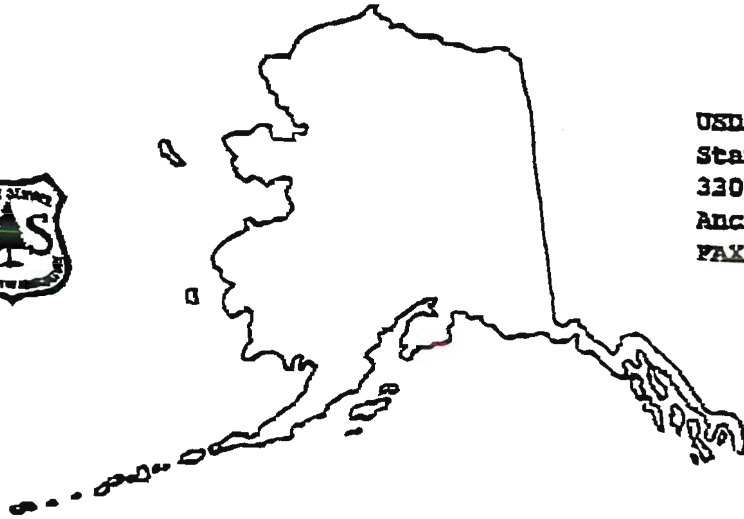

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TO: Karen Klinge FAX NO.: 276-7178

UNIT: Exxon Council PHONE NO.: 278-8012

FROM: Ed Holsten PHONE NO.: 271-2573

REMARKS: Karen - Thanks for the opportunity to review - I appreciate it - I made a few additional comments - Ed

TOTAL NUMBER OF PAGES (INCLUDING COVER): 3

DATE SENT: 5/11 TIME:

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EIS

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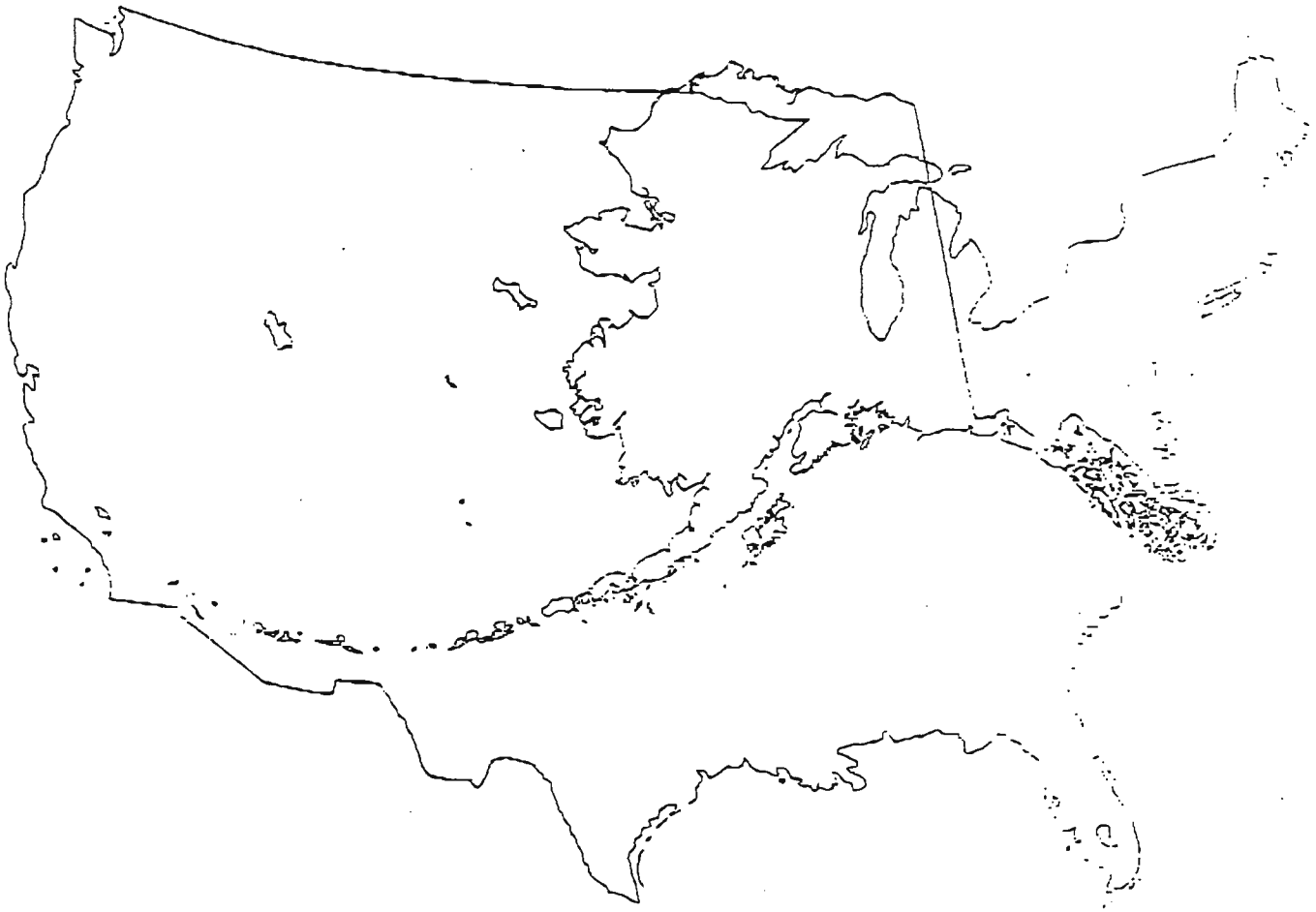
To: Rod Kuhn	Date/time: 5/13/94 4:00
From: Catherine Berg	Deliver ASAP! X Call _____ to have picked up Deliver in next mail run ____
Subject: draft EIS comments	Please call above number(s) to confirm.



U.S. Fish and Wildlife Service comments

signed original forthcoming.

GB

DEC

Memorandum

To: EVOS Environmental Impact Statement Project Manager

From: Regional Director
Region 7

Subject: Comments on Preliminary Draft Environmental Impact Statement for the *Exxon Valdez* Oil Spill Restoration Plan

We have reviewed the subject draft document and have the following comments for your consideration. The first set of comments are general in nature followed by more specific comments.

General Comments

- The U.S. Fish and Wildlife Service (Service) was pleased to see that the document presents a comprehensive set of alternative proposals. This will allow the Trustees to select from a broad range of activities and provide a balanced approach for the restoration program. The document also adequately explores the issues most commonly raised by the public.

The purpose statement for this environmental impact statement is somewhat confusing. The purpose assumes that this document would provide National Environmental Protection Act (NEPA) compliance for the restoration plan as a whole based on a proposed action, however, additional environmental analysis would need to be conducted for each approved action taken under the restoration plan. Although this need for additional analysis is mentioned in various places throughout the document, it needs to be clearly stated in the purpose at the beginning of the document. This is a programmatic document and, therfore, conclusions will not be drawn for specific actions but will be based on selected programs. Conflicting statements regarding impacts occur throughout the document. Some statements generalize the impacts by alternative and some specify the impact by action. In many cases throughout the Environmental Consequences section it is stated that actions would have no adverse impacts on or would be highly beneficial to the affected resources. Until these actions are specifically defined this may not be the case. These statements are inconsistent with the more general assumptions regarding the alternatives. The document must present a more consistent format: generalize the impacts by alternative or specify the impacts by action. Because this is a programmatic document, the former is more appropriate.

One of the major components of the proposed action (Alternative 5) is Research and Monitoring. In Chapter 1, it is stated that information gathered through a research and monitoring program could "...be extremely beneficial to the restoration of injured resources or the services they provide." However, in Table 2.1 where you address the issues by alternative no mention is made, under any of the alternatives, of the benefits that research and monitoring would have on restoration. For example, under Issue #1 (Alternative 5), research and monitoring would provide a greater understanding of the ecosystem injury and allow better decision-making for restoration projects and more efficient expenditure of funds. The analysis in Table 2.1 should include research and monitoring where applicable and especially under Alternative 5 where a large portion of the money is proposed for this effort.

Specific Comments

Page 1.12, Impact Topics. What is an "Impact Topic"? A definition of this term is clearly needed.

Page 1.14, Possible Conflicts Between Proposed Actions and Other Plans. We suggest that you add the Kodiak National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Alaska Maritime Wildlife Refuge CCP under the list of programs and plans that were reviewed.

Page 1.15, Findings. We recommend adding the following subheading and text in this section:

> National Wildlife Refuge System Comprehensive Conservation Plans. The Fish and Wildlife Service has reviewed the relationship between the Kodiak National Wildlife Refuge CCP, and Alaska Maritime National Wildlife Refuge CCP, and the EVOS Draft Restoration Plan and reached the following conclusions:
>
> - Habitat protection and acquisition are compatible and consistent with the Kodiak National Wildlife Refuge and Alaska Maritime National Wildlife Refuge CCP's.
>
> - Acquisition of high value habitats and inholdings within the Kodiak National Wildlife Refuge and Alaska Maritime National Wildlife Refuge is supported by the CCP's. Also, the Kodiak National Wildlife Refuge Land Protection Plan describes and sets priorities for all refuge inholdings for protection status.
>
> - Certain specific actions that could be undertaken in implementing the Restoration Plan, such as developing new facilities or employing habitat manipulation techniques, could be in conflict with refuge plans. However, the Draft Restoration Plan does not identify where any actions will occur and requires that all actions be in compliance with Federal and State laws and

regulations. There is no provision or direction in the Draft Restoration Plan to conduct activities on any Federal, State, or private lands when the land manager is not in agreement with the action.

Page 1.18, Regional Comprehensive Salmon Enhancement Plans. We recommend the information dealing with Service land management responsibilities under this heading be deleted. (This is covered under "Findings.")

Page 1.19, Impact Topics Not Analyzed. We recommend that you include a statement here that provides for further study or restoration for these species should future evidence reveal that such efforts would be warranted.

Page 2.11, Typical Actions Assumed Under Alternative 5. Although no impacts analysis would be done for Research and Monitoring, this is definitely an action item that would occur under Alternative 5 and should be listed here. Research and Monitoring will clearly address the issues previously outlined in Chapter 1.

Pages 2.14-15, Table 2-1. Issues Addressed by Alternatives. We recommend that you include discussion of Research and Monitoring under the appropriate alternatives.

Page 2.17, Table 2-3. Comparison of the Impacts of the Alternatives. This should be moved to Chapter 4; no discussion of resource impacts has occurred within Chapter 2. This table would be more appropriate under the Environmental Consequences section. Also, it should be noted that this describes long-term benefits as opposed to adverse impacts. This is not clear when reviewing the table.

Page 2.18, Table 2-4. Definitions of Impact Levels. This table should be moved to Chapter 4, also, for the same reason as mentioned above.

Pages 4.1-129, Chapter 4. Environmental Consequences. We recommend that this Chapter be reviewed for the use of the word "action." There is inconsistency in the environmental analysis of the alternatives in that in some cases specific actions are analyzed. This is probably just an oversight in terminology but it causes great confusion and inconsistency in the conclusions drawn for each injured resource and service.

Page 4.2, first paragraph. Insert the word "directly." "Monitoring and research, as actions, generally do not directly impact resources..." KAK

Page 4.134, Common Murres. Conclusions. Proposed oil development would not have extremely high negative impacts on the birds. This needs to be reworded.

These comments are not comprehensive due to the limited review period. We look forward to reviewing the draft document. If you have any questions regarding these comments, please contact Catherine Berg at 786-3598.

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C
E/S

IN REPLY REFER TO:
MMF/LHB

May 13, 1994

Memorandum

To: Rod Kuhn, EIS Project Manager, Exxon Valdez Oil Spill Trustee Council

From: Acting Director, Alaska Science Center

Subject: Comments-Draft Environmental Impact Statement (DEIS)

Our review comments at this time are restricted to two general areas of concern:

Firstly,

The DEIS does not seem to address the potential environmental impacts of general restoration actions on the ecosystem. For example, pen and hatchery rearing and creation of new fisheries are given as examples under Alternative 3, 4, and 5: General Restoration-Fish. The associated text speaks to the probability of actions being successful in reaching restoration goals (e.g., population increases), but does not speak to the impact of such activities on ecosystem integrity. Although one can argue what the level of impact might be with increased hatchery or other enhancement activities, for example, the text still should acknowledge that evidence exists that such activities can impact wild populations and their associated ecosystem. Examples of such language are from Holland-Bartels et al. (1994):

> "Restoration or enhancement of wild stocks through use of hatcheries has a long history in the Pacific Northwest (Kelly et al. 1990). However, this strategy is under an active debate in the fisheries profession (Martin et al. 1992, Hilborn 1992), centered around documented or suspected impacts of hatchery activities on wild stocks. Recommendations have been made to consider genetic diversity of wild stocks and genetic-based approaches to management (Kapuscinski and Philipp 1988, Waples et al. 1990) and, in part, implemented through various state policies as reviewed by Kelly et al. (1990) for the Pacific Northwest."

> "...Potential interactions between propagated and wild salmon are well known (Hindar et al. 1991, Krueger and May 1991, Waples 1991). Genetic alterations, increased competition and predation, high exploitation of wild salmon in mixed-stock fisheries, and disease introduction are several issues of concern (Table 1)."

Similar concerns perhaps need to be acknowledged for other general restoration activities cited as examples, but because of time we present only this example.

Secondly,

The document needs to acknowledge that restoration actions taken for any given injured resource or service may, in fact, impact the success or timeframe for restoration of another. For example, restoration of sea otter populations may impact their prey (intertidal/subtitdal organisms) abundance as has been demonstrated sufficiently elsewhere. Restoration of fishing may impact fisheries restoration. There are many more examples. The end point of a "healthy, productive ecosystem" may require that compromises be made. Such decisions are political as well as biological and the choices are not appropriate within the EIS. However, acknowledgement of at least the biological interrelationships that exist should be included. A crosswalked table of the hypothesized relationships among injured resources could accomplish this.

We appreciate the opportunity to comment.

William K. Seitz

Attachments

Table 1. Types of salmon enhancement used in Alaska and possible impacts and risks to wild stocks as synthesized from selected literature.

Enhancement Type	Possible Impact and Risk	Citation
Introductions	Increased competition with resident fishes.	Krueger and May 1991
	Increased predation on resident fishes.	Krueger and May 1991
	Unwanted gene flow (straying) from fry releases.	Unwin and Quinn 1993
	Unwanted gene flow (straying) from smolt releases.	Unwin and Quinn 1993
	Incidental harvest of other stocks.	Wright 1981
Supplementation:		
Non-Indigenous Stock	Intraspecific genetic change.	Waples 1991
	Outbreeding depression.	Gharrett and Smoker 1991
	Unwanted gene flow (straying) from fry releases.	Unwin and Quinn 1993
	Unwanted gene flow (straying) from smolt releases.	Unwin and Quinn 1993
	Decreased fitness from competition, disease.	Hemmingsen et al. 1986
	Increased exploitation of native fish.	McIntyre and Reisenbichler 1986
Indigenous Stock	Intraspecific genetic change.	Waples 1991
	Unwanted gene flow (straying) from fry releases.	Unwin and Quinn 1993
	Unwanted gene flow (straying) from smolt releases.	Unwin and Quinn 1993
	Decreased fitness from competition, disease.	Waples 1991
	Increased exploitation of native fish.	McIntyre and Reisenbichler 1986
Habitat Modification:		
Stream Rehabilitation	Change in stream dynamics.	Ryder and Kerr 1989
Lake Enrichment	Change in fish community balance.	O'Neill and Hyatt 1987

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from D.M. Patten Oil Final Rept.

E

E/S

APPENDIX 1

Effects of Oil Exposure on Seabirds and Waterfowl: A Literature Review

INTRODUCTION

Effects of petroleum exposure on seabirds and waterfowl were investigated and summarized bec
Petroleum exposure effects were
(1) metabolic changes resulting
reproductive effects, which are
Effects on reproduction may be dr
of reproductive activity for lon
as decreased viability of eggs
petroleum exposure may also
synergistic. Both reproductive
from petroleum ingestion. Internal exposure to seabirds and waterfowl may be either from preening oiled feathers or consumption of oiled food.

METHODS

The literature on effects of sublethal petroleum hydrocarbon ingestion was sorted by aspects of exposure to seabird and waterfowl physiology or reproduction. Each article was then summarized. Because of the large number of references, only the most relevant are indicated in the text below for ease of reading. We are grateful to Dr. D.M. Fry for access to this bibliography.

RESULTS

Wedge-tailed Shearwaters breeding in Hawaii were treated with small amounts (0.1 - 2.0 ml) of weathered crude oil on upper breast feathers, or by oral doses in capsules, approximately 30 days prior to egg laying. Oil exposure did not cause birds to move to new areas but resulted in nest abandonment and reduced incubation effectiveness. Two ml of weathered oil applied externally to breast plumage resulted in greatly reduced number of eggs laid and complete hatching failure. Oral doses of oil also reduced laying and breeding success. Long-term effects of a single external application of 2.0 ml of weathered oil were demonstrated by a decreased number of birds returning to the colony in the year after dosing and reduced breeding success one year after oil exposure (Fry et al. 1986b).

Cassin's Auklets breeding on Southeast Farallon Island, CA, were exposed to a single 1 ml application of weathered crude oil on breast plumage either during courtship or during mid-incubation (Fry and Addiego 1988). A high proportion of auklets dosed externally with oil prior to egg laying responded by abandoning the

breeding season. Those birds remaining were delayed in egg laying by more than 20 days. Auklets exposed externally to oil in mid-incubation exhibited a high frequency of abandonment, low hatching success, and low net breeding success. Oil exposure resulted in a lower proportion of female auklets returning in the year following exposure, and reduced breeding success (Fry and Addiego 1988).

Effects of external petroleum exposure on eggs (five species and 16 studies) indicated reproductive impacts on a number of species. Oiling of eggs results in decreased hatchability (Grau et al. 1977; Ainley et al. 1979; King and Lefever 1979; Albers and Heinz 1983). Extremely small amounts of crude oil (50 microliters) exposure to the egg shell surface are toxic to the developing embryo, especially at early stages of incubation. Decreased sensitivity to petroleum exposure develops with increasing age of the embryo (Albers 1978). Subsequent retardation of chick growth may occur after hatching, as well as developmental effects such as deformed feathers, malformation of the bill, and decreased functioning of the salt gland located in the supraorbital region of the skull (Hoffman 1979a; 1979b; Hoffman, Eastin and Gay 1982; Sheppard, Wells and Georghiou 1983; Hoffman and Albers 1984; Couillard and Leighton 1989; 1990).

Petroleum exposure has also led to behavioral changes such as failure of Antarctic Skuas to defend nestlings. This caused complete reproductive loss even when eggs and young were viable (Eppley and Rubega 1990).

The sublethal effects of internal petroleum exposure reported in 39 studies of 13 bird species demonstrated similar metabolic pathways in organs and organ systems. Sublethal metabolic effects of petroleum exposure result in decreased vigor of mature birds, especially when oiling is chronic at low concentrations (Holmes, Gorsline and Cronshaw 1979; Leighton 1983; Albers 1984; Fry and Addiego 1988). The metabolic effects of petroleum exposure may occur throughout the entire bird. Tests for presence of petroleum in duck tissues indicate highest levels present in skin and adipose tissue, but petrochemicals are also found in liver, breast muscle, heart muscle, brain, uropygial gland, and blood (Lawler et al. 1978). Body homeostasis mechanisms, such as thermoregulation, blood oxygen levels, hormone levels, steroid metabolism, cellular transport systems, glycogen and fat storage, and oxidation/reduction (energy release) mechanisms, are disrupted as a result of sublethal petroleum ingestion (Gorman and Milne 1970; McEwan and Whitehead 1977; Gorsline 1982; Leighton 1983; Leighton, Peakall and Butler 1983; Jenssen, Ekker and Bech 1985; Fry et al. 1986a; Khan et al. 1986; Fry and Addiego 1988).

Ingested oil causes elevated metabolic rates, initially characterized by increased feeding rates, but subsequently followed by decreased feeding rates (Gorman and Milne 1970; Lanenburg and Dein 1983). The bird may lose vigor and become hypothermic

Subtle and multifaceted sublethal effects to birds, such as cessation of reproduction, may occur from minute amounts of oil ingestion without accompanying histopathology (Cavanaugh 1982; Fry et al 1986b; Fry and Addiego 1988). These effects may result from disruption of the adrenal cortex by alteration of pituitary hormone levels (Gorman and Milne 1970; Harvey, Sharp and Phillips 1982; Gorsline 1983).

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E

EIS

March 23, 1994

TO: Bob Spies, Chief Scientist FROM: Gerry Sanger, EIS Team Wildlife Biologist

SUBJ: Reconciliation of Bird Damage Assessment Statements

Here is what we're trying to resolve re: Injury Statements for HADU and MAMU:

Harlequin Duck

Draft Plan Statement	**Bird Study 11**	**Bird Study 2**
"Resident pre-spill population of hadu in western PWS was estimated to be approximately 2,000."	Unclear whether sampling design had sufficient rigor to derive realistic population estimate.	July oiled zone estimates: 1989: 474 - 1,242 1990: 266 - 3,302 1991: 299 - 1,035 1993: 1,109 - 3,275
No indication of recovered productivity	No evidence of breeding, but no rigorous population estimate	'93 estimate of 1,100-3,300 may indicate recovering oiled zone population.
"...recovery may not occur for several decades."		'93 estimate of 1,100-3,300 may indicate recovering oiled zone population.

Comments: - There are no baseline data showing hadu reproduced in spill zone before spill.
- Sound wide, July hadu population is significantly higher than in 1972

Marbled Murrelet

Draft Plan Statement	**Bird Study 6**	**Bird Study 2**
8,000-12,000* mamu killed by spill	Best estimate = 8,400** killed (Kuletz 1993)	No spill-affect population decline in spill area (K & L ms, Tbl 2)
Gives *mean* 89-91 pop estimates at 107 k, 81 k, 106 k, claims variability.	Naked I counts show #'s rebounded to pre-spill levels in 1990-1992	With 95% CI, 89-93 pop estimates not significantly different
Scientists expect decline to continue	Most authoritative source (Kuletz) knows nothing about this - not her view	89-93 data show population stable or increasing

**Ancient Murelet's factored out

cc: Rod Kuhn, Karen Klinge

* Includes all murrelets, including ANMU

Table . Summary of injury assessment to birds from EVOS, through 1993 studies.

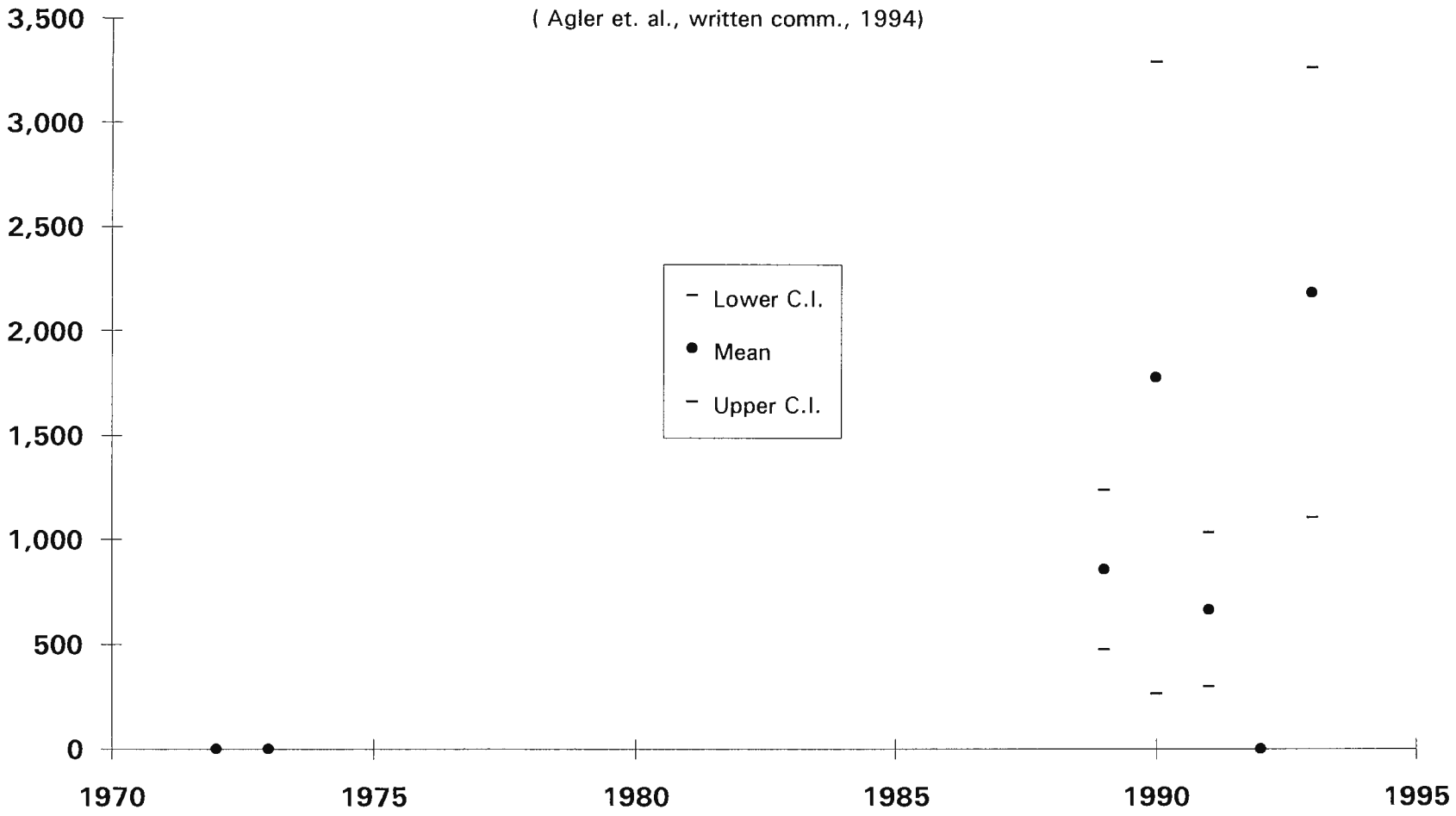
Resource	Description of Injury			Recovery Status in December, 1993		Geog. Extent of Injury				Comments/Discussion
	Oil Spill Mortality	Population Decline After Spill	Sublethal Effects?	Current Population Status	Sublethal Effects Continue?	PWS	Keni	Kod.	AK Pen.	
Harlequin Duck	about 1,000	Yes, ca. 77%	Yes, no breeding. Body tissue hydrocarbon contamination.	May be stabilizing	Yes	Yes	Yes(d)	Yes(d)	Yes(d)	No evidence of breeding in spill zone since spill. PWS population stable '90, '91, '93 at higher level than pre-spill.; oiled zone population unstable, but highest in '93 since spill. Status outside PWS unknown.
Common Murre	170,000-300,	Yes	YES	Some recovery in Barrens; status unknown elsewhere	Some	No	Yes	Yes	Yes	Barren Islands population still depleted, but timing of breeding and productivity rates normal in '92 and '93. Status at injured Chiswell Islands and Puale Bay colonies unknown.
Pigeon Guillemot	1,500-3,000	Yes, ca. 34%	No	Possibly stabilizing	Unknown	Yes	Yes(d)	Yes(d)	Yes(d)	PWS population stable '90, '91, '93 at higher level than pre-spill.; oiled zone population unstable, but highest in '93 since spill.
Marbled Murrelet	8,400	Yes, 4 - 7% of 1993 population estimate	No	Stabilizing	Unknown, but may be stabilizing	Yes	Yes(d)	Yes(d)	Yes(d)	PWS population declining before spill, but may be stabilizing. Local counts at Naked Island have returned to pre-spill level.

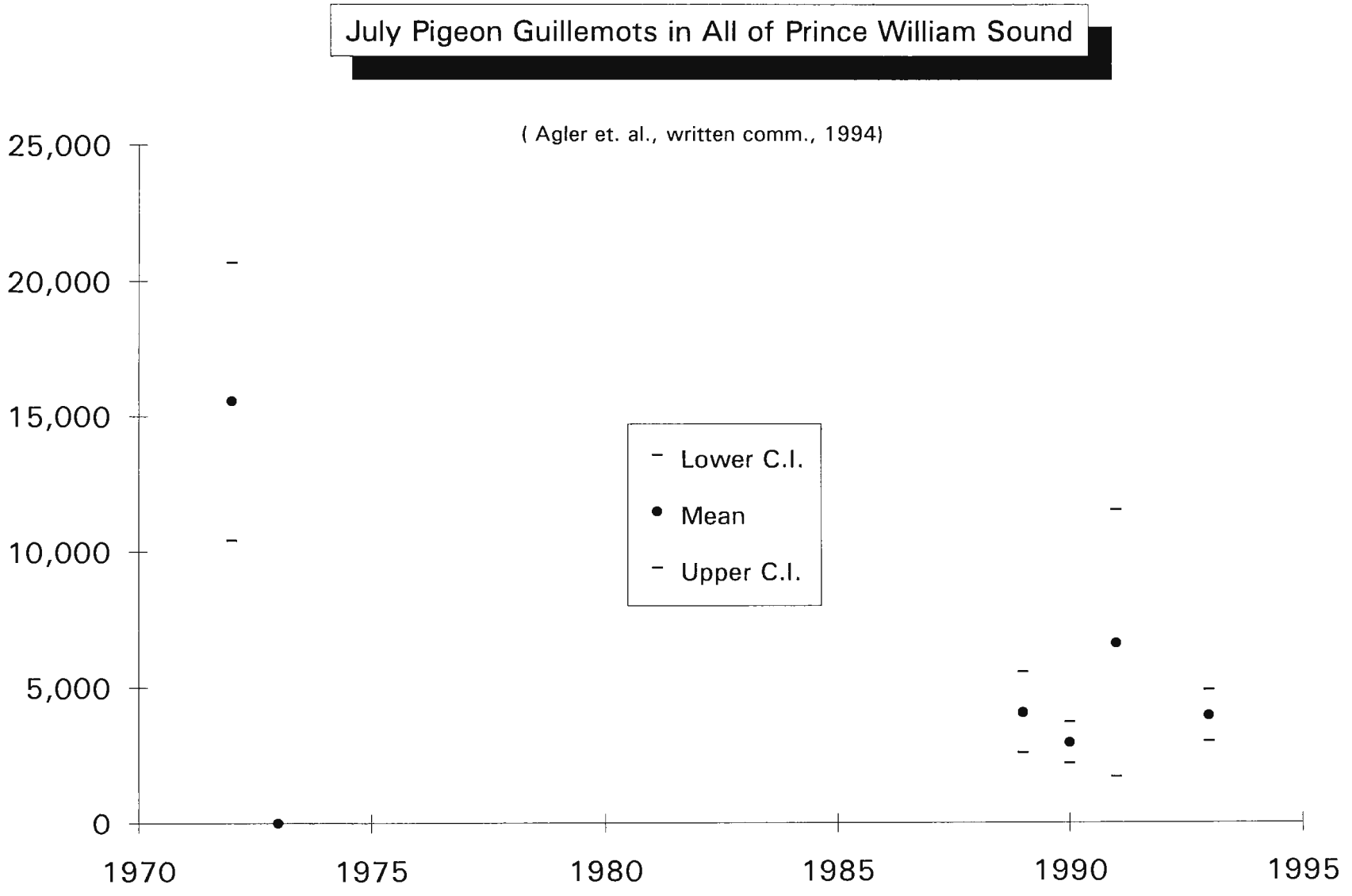
July Harlequin Ducks in All of PWS

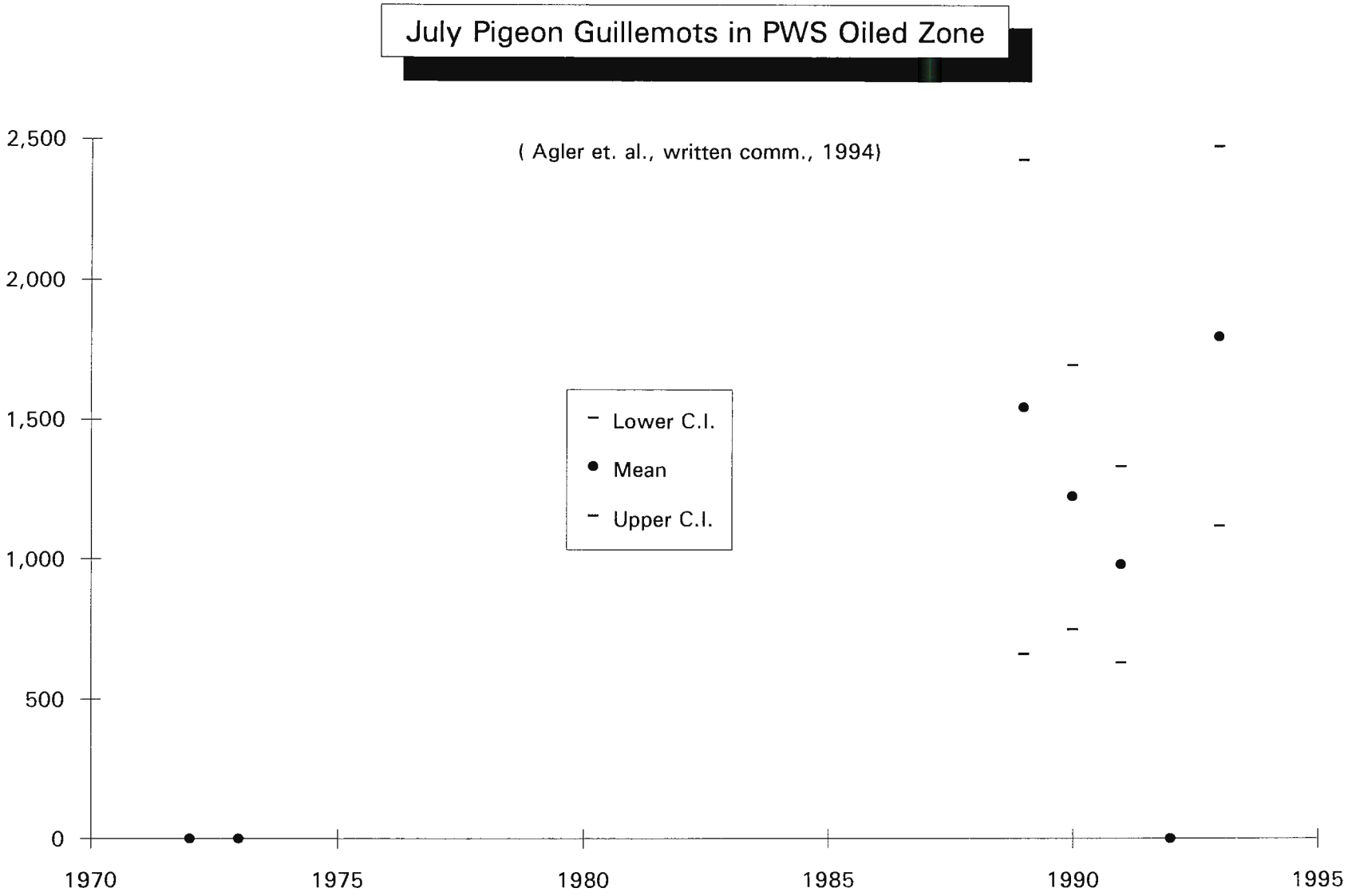
(Agler et. al., written comm., 1994)

July Harlequin Ducks in PWS Oiled Zone

(Agler et. al., written comm., 1994)

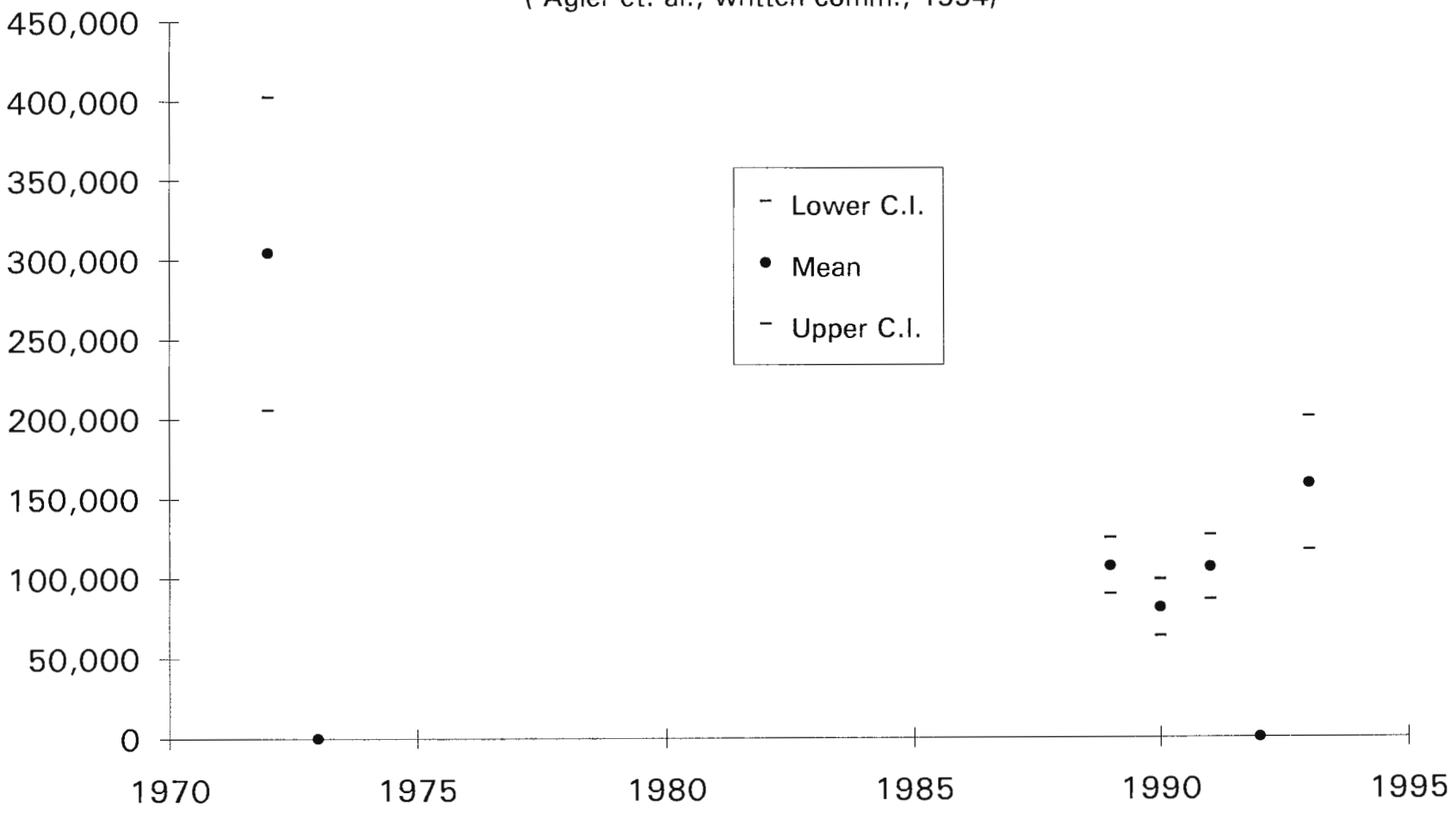



July Pigeon Guillemots in All of Prince William Sound
(Agler et. al., written comm., 1994)
25,000
20,000
15,000
10,000
5,000
0
1970
1975
1980
1985
1990
1995
Lower C.I.
Mean
Upper C.I.


July Pigeon Guillemots in PWS Oiled Zone
(Agler et. al., written comm., 1994)
2,500
2,000
1,500
1,000
500
0
1970
1975
1980
1985
1990
1995
Lower C.I.
Mean
Upper C.I.

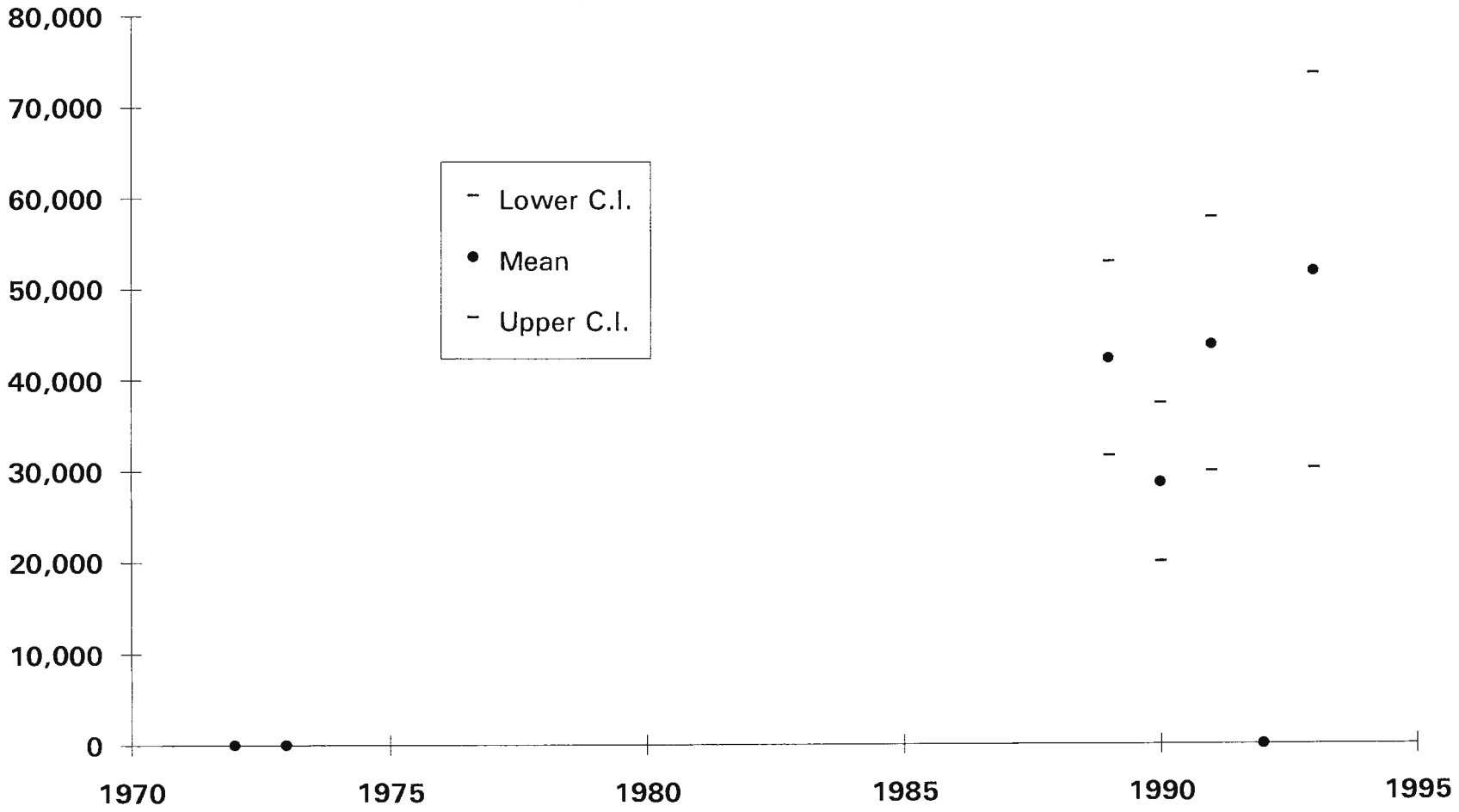
July Marbled Murrelets in Prince William Sound

(Agler et. al., written comm., 1994)



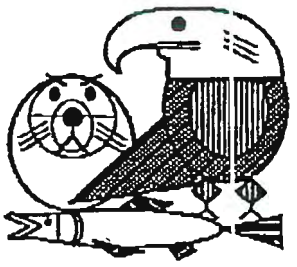
July Marbled Murrelets in PWS Oiled Zone

(Agler et. al., written comm., 1994)



E
EIS

Exxon Valdez Oil Spill Trustee Council
Restoration Office
645 G Street, Suite 401, Anchorage, AK 99501-3451
Phone: (907) 278-8012 Fax: (907) 276-7178



FAX COVER SHEET

To: Kathy Frost Number: 452-6410

From: Karen Klinge Date: 6 April

Comments: Total Pages: 8

Here is the draft I spoke of last Friday.

Dear Kathy,

I apologize that I didn't get this to you earlier in the week. This is still a rough draft with a few fill in the blanks that still need to be dealt with. As I told you over the telephone, this is the bulk of the harbor seal section in the environmental consequences chapter of the draft EIS. I am being pressured to be "quantitative", but am very uncomfortable providing any more detail than what I have included in this draft. I would appreciate it if you would take a look at this and either give me a call (278-8012) or FAX a response to me (276-7178).

Also, please let me know if your NRDA report has been finalized and if so, is the year 1993 or 1994? If it is still in draft form, I have been told to change my citations to Frost and Lowry, written communication, 1993, and then include the citation in the bibliography as a draft report.

Thanks a lot!

Karen Klinge

HARBOR SEALS - NO ACTION **DRAFT MARCH 29,1994**

Harbor seals are protected from commercial harvesting, harassment and indiscriminate killing by the Marine Mammal Protection Act of 1972 (MMPA). Traditional subsistence harvest by Alaska Natives is exempted from the MMPA. The MMPA also allows for some loss from incidental take by commercial fishermen.

Harbor seal populations have responded to the protection which outlawed indiscriminate killing and commercial harvesting by increasing in many parts of their range (CITE. Harvey et a 90 Documented rates of increase have been as high as 22 percent per year (5-22% range) use all 3 cited in my Rpt on p 38 Stewart et al 88, Harvey et al 90 (cite). Most of these increases have been from populations that were exploited prior to Olesiuk et al 9 the MMPA and show a response to reduced mortality. There have been no long term studies to document changes to harbor seal populations as a result of oil spills (Stewart, Yochem and Jehl, 1992), or from other habitat perturbations.

In contrast to harbor seal populations in other areas, seals in the central and western regions of the Gulf of Alaska have been declining since the mid-1970's (Pitcher, 1990). Population trend indices, based on counts at haulout sites, have shown a drastic decline (about 85%) in the population near Tugidak Island, in the Kodiak Archipelago. Similar declines, approximately 11 percent per year since 1984, were documented in Prince William Sound prior to the oil spill. Why these populations show decreases when other populations are increasing puzzles scientists and complicates understanding the effects

and potential recovery from the Exxon Valdez oil spill.

Subsistence harvest and interactions with commercial fisheries (eg. entanglement and drowning in gear, or through being shot to protect catch) may be contributing to the decline, but are not thought to be the cause (Pitcher 1990, Frost and Lowry 1993). Records of subsistence harvest at Tatitlek and Chenega Bay, the two largest seal harvesting communities in Prince William Sound, have been gathered only intermittently, but from April 1990 to March 1991, 133 seals were harvested (ADF&G ~~Division of~~ Subsistence, unpublished data as cited in Frost and Lowry 1993). This represents, at most, 5 percent of the population counted during molting surveys (Loughlin 1992 in Frost and Lowry 1993). Although this level of harvest is unlikely to cause the decline in seal numbers, any additional mortality may slow recovery.

Interactions between harbor seals and commercial fisheries also may affect the recovery of the seal population. Seals can become entangled and drown in lost gear, or they may become injured or killed as fishermen attempt to protect their catch and nets. There have been no studies that document the number of seals that may be lost due to incidental take in Prince William Sound; however, records kept during an observation program for Stellar sea lions suggest that {need to fillinthese data - find observer report...}

The Exxon Valdez oil spill killed an estimated 300 harbor seals from the Prince William Sound population. Recent population trend counts indicate that the population may be

Frost et al ~~+ Lowry~~ in press

not an approp ref

stabilizing from the long term decline (~~Spies, 1994~~); however, until the population begins to increase it will be impossible to predict how long it will take the population to recover. In Prince William Sound, there are at least three possible ways to define recovery for the local harbor seal populations.

- Recovery from the oil spill could occur when the population has increased by 300 individuals (to compensate for the 300 lost in the oil spill) in the oiled areas.

- Recovery could occur when the population has returned to its 1970's levels of abundance. This would show recovery not only from the spill, but also whatever was causing the long term decline.

- Recovery occurs when the productivity rates and population age structure is comparable to those of nonoiled areas.

There are no data on injury in other regions of the oil spill area, and ~~it is possible that direct effects from the oil spill were absent, or considerably reduced outside of Prince William Sound~~ the impacts on harbor seals in those areas are unknown. However, recent trend counts near Tugidak Island ~~give no~~ show indications that the long term decline is abating (~~cite~~ Frost + Lowry in press). Until research is conducted to determine what is causing the long term decline, or until monitoring shows that the populations are increasing, any estimates of recovery will be speculative.

clear evidence that seals were oiled

Conclusion: At this time, there is too little information available to predict when the

Frost, K.J., L.F. Lowry, E. Sinclair, J. Ver Hoef, and D.C. McAllister. In press. Impacts on distribution, abundance, and productivity of harbor seals. In T.R. Loughlin (ed.) Impacts of the Exxon Valdez oil spill ... Academic Press

populations within the EVOS area will recover. Recovery is unknown for all regions of the spill area.

Harbor Seals - Alternative 3

The greatest way to benefit the injured harbor seal populations is to determine what has caused the long term decline of populations throughout the Gulf of Alaska. Such research activities cannot be analyzed in this DEIS because the environmental effects are dependent on the outcome of the research and how the results can be used for restoration. For this analysis we can only consider the effects of habitat protection and the three types of General Restoration Actions proposed in the Summary of Alternatives. Two of the proposed actions are information based programs that would be designed to change the impact of commercial fisheries or of subsistence harvest on the recovering seal populations.

Subsistence harvest is not believed to be the cause of the long term decline of harbor seal populations in the Gulf of Alaska; however, any additional mortality may slow the recovery of injured populations. Subsistence harvest in Prince William Sound declined as a result of the oil spill and in 1991 harvest levels were probably less than 5 percent of the population. A healthy seal population would be able to easily sustain that level of harvest. Depending on the distribution, sex and age of the animals harvested, a 5 percent harvest could negatively affect an injured population.

One of the proposed actions would establish a cooperative program between subsistence users and research scientists or agency managers. The program would be designed to provide a two-way exchange of information that would provide benefits to all sides and could benefit the injured harbor seal populations. For example, recent studies indicated that harbor seals have a high site fidelity to molting and pupping areas (e.g. the same individuals consistently use the same areas) (Pitcher 1990). If some of these areas show greater declines than other sites within Prince William Sound, then redirecting harvest towards the healthier, or the nonoiled areas could reduce any negative effects from the harvest without actually changing the number of animals harvested.

A similar cooperative program with commercial fishermen could also reduce pressure on the injured seal populations. This program would provide information on deterant methods and regulations. Ideally it would provide information to the scientists on the extent of the interactions between the commercial fisheries and the seals, and would reduce the number of seal mortalities. As with subsistence harvest, the interactions with commercial fisheries are not believed to be the cause of the seal decline; however, the more that can be done to minimize the effects of human caused mortality, the more likely it will be that the population will stabilize and recover.

The last action proposed for harbor seals in this alternative is to reduce disturbance at haulout sites in the oil spill area. Several studies have documented the effects of disturbances on harbor seals and other pinnipeds (Allen, et al. 1984; Esipenko, 1986;

Johnson, et al. 1989). These studies have shown that the greatest impacts from disturbance are during pupping and molting seasons. During pupping, disturbance can result in higher pup mortality caused by abandonment, or from being crushed as the adults panic and return to the water (Johnson, 1977). During molting, seals are under physiological stress and may be more susceptible to disease and injury. The greatest disturbance is caused when people walk near or through haulout sites (Johnson, et al. 1989), seals are less disturbed by boats or planes as long as the distance is reasonable. Within the EVOS area, there have been no studies to document the amount or effects of disturbance. Without these data, it is impossible to determine if this action will reduce seal mortality and aid recovery, however, it may become increasingly important as recreational use of the EVOS area expands.

Aside from monitoring and research activities, and assuming that the actions previously described are implemented, none of the other actions proposed under this alternative for other resources or services are likely to impact harbor seals.

Conclusion: The short term effect of these actions will be negligible for harbor seals because they will all require some time after implementation before any changes could be expected. The long term effects of these actions would be moderately beneficial, changing either the number or population level impact of human caused mortality.