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

March 31, 2003

Thomas A. Readinger
Associate Director for Offshore Minerals Management
Minerals Management Service
Washington, D.C. 20240

Dear Mr. Readinger:

Enclosed is the Biological Opinion by the National Marine Fisheries Service (NMFS) for the "Federal Oil and Gas Leasing and Exploration Sales 191 and 199 within the Cook Inlet, Alaska Planning Area" by Minerals Management Service (MMS). The Biological Opinion examines the effects of these sales on endangered and threatened species in accordance with section 7 of the Endangered Species Act. The MMS requested consultation on this action in a letter to NMFS dated November 12, 2002. A Biological Evaluation of leasing and exploration actions in Cook Inlet was also provided by MMS as part of the December 2002, Draft Environmental Impact Statement (DEIS) for this action. NMFS acknowledged receipt of this information in a letter dated January 6, 2003.

This Biological Opinion is based on information provided in the DEIS and other sources of information. A complete administrative record of this consultation is on file at the NMFS office in Anchorage, Alaska.

NMFS concludes that leasing and exploration are not likely to jeopardize the continued existence of the Steller sea lion, or fin and humpback whales, nor result in the adverse modification of critical habitat. In formulating this opinion, NMFS used the best available information, including information provided by MMS and recent research on the effects of oil and gas activities on the listed species. This opinion addresses Sales 191 and 199. However, an Environmental Assessment and/or updated Biological Evaluation will be prepared by MMS prior to Sale 199. NMFS reserves the opportunity to reconsider and possibly modify this opinion during the planning process for Sale 199.

Conservation recommendations are provided with the opinion which are intended to improve our understanding of the impacts of oil and gas activities on listed species, as well as to minimize or mitigate adverse effects.

Sincerely,

James W. Balsiger for
Administrator, Alaska Region

ENDANGERED SPECIES ACT: SECTION 7 CONSULTATION

BIOLOGICAL OPINION

Agency:	Minerals Management Service
Activity:	Oil and Gas Sales 191 and 199 Cook Inlet, Alaska Planning Area; and Authorization of Small Takes Under the Marine Mammal Protection Act
Consultation By:	National Marine Fisheries Service Alaska Region

Date Issued: ______________________

Approved By: ______________________ 3/31/03

for James W. Balsiger, Administrator, Alaska Region, National Marine Fisheries Service — Date

TABLE OF CONTENTS

1.0 PURPOSE AND CONSULTATION HISTORY

1.1 Introduction

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), requires that each Federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species listed under the ESA, or result in the destruction or adverse modification of critical habitat of such species. When the action of a Federal agency may affect a threatened or endangered species, that agency is required to consult with either the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (FWS), depending on the listed species that may be affected. For the actions described in this document, the Action Agencies are the U.S. Department of the Interior, Minerals Management Service (MMS) and the U.S. Department of Commerce, NMFS.

This document constitutes the Biological Opinion (Opinion) by NMFS of the effect on listed species of proposed Oil and Gas Lease Sale 191 within the Cook Inlet, Alaska planning area of the U.S. Outer Continental Shelf (OCS), and of future incidental take authorizations issued by NMFS under section 101(a)(5) of the Marine Mammal Protection Act of 1972 (MMPA). This Opinion evaluates the impacts of leasing and exploration on Steller sea lions, fin whales and humpback whales, and determines whether the described actions may jeopardize their continued existence or adversely modify critical habitat of Steller sea lions. This Opinion incorporates much of the information presented within the Biological Evaluation/DEIS prepared by the Minerals Management Service, as well as pertinent research on matters related to oil exploration. Traditional knowledge and the observations of Native Alaskans were also considered in preparing this opinion, along with information gained through scientific research. This knowledge contributes, along with western science, to a more complete understanding of these issues. A reasonable assessment of potential effects can only be made by considering both these systems of knowledge.

This Opinion addresses the incremental-step of leasing and exploration. Its purpose is to provide an assessment of those actions on the continued existence of endangered Steller sea lion, fin, and humpback whales, as well as to provide measures to conserve these species and mitigate any potential impacts. NMFS believes the subsequent phases of OCS development, production, transportation, and abandonment will require additional consultation. This is due in part to their uncertainty at this time and the many variables associated with individual tract development. However, some information on development and production is presented and assessed in this Opinion in order to provide an adequate evaluation regarding the reasonable likelihood of the entire action violating section 7(a)(2) of the Endangered Species Act, as amended. Should commercially producible quantities of oil be discovered and development and production be proposed, MMS would initiate new formal consultation. Further consultation would also occur if additional species were listed or critical habitat designated, if the proposed action were substantially modified, or if significant new effects-related information were developed.

1.2 Consultation History

NMFS has consulted with MMS on previous lease sales in this region. These included Sales 149 (1995), 88 (1984), 46, 55, and 60 (1980). None of these opinions found the proposed sales were likely to jeopardize the continued existence of listed species, or cause adverse modification of critical habitat.

As required under the ESA, MMS notified NMFS by letter dated June 18, 2002, of those endangered, threatened, and candidate species of which it was aware that could occur in areas within or near the Cook Inlet program area and that could, therefore, be potentially affected by the Proposed Action. NMFS responded by letter dated June 23, 2002, confirming that consultation should occur for the following species under its jurisdiction: blue whales, humpback whales, fin whales, North Pacific right whales, sei whales, sperm whales, and the Steller sea lion (western and eastern) populations. Subsequent assessment within the DEIS determined that three of these species are likely to be adversely affected. NMFS proceeded with formal consultation and preparation of this opinion in consideration of those three species.

Minerals Management Service requested this opinion supercede previous consultations on all prior and existing lease sales in the OCS within Cook Inlet. As noted above, NMFS and MMS have previously consulted on OCS Lease Sales in the Cook Inlet region; all of which overlap with portions of the area proposed for leasing under Sales 191 and 199. Since the location of existing active leases are within the proposed areas for Sales 191 and 199, this opinion supercedes all previous opinions of NMFS and applies to any new leases within that area. This opinion does not apply to areas outside of the area proposed for leasing in the DEIS for Sales 191 and 199.

1.3 Term of this Opinion

This Opinion is valid upon issuance and remains in force until re-initiation may become necessary due to factors described in section 1.1. NMFS will re-initiate consultation if there are significant changes in the type of exploratory activities occurring on the OCS, or if new information indicates these actions are impacting listed species or critical habitat to a degree or in a manner not previously considered.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The discussion in this section is based on the exploration and development scenarios presented in section II.A, section II.B, and Appendix B of this Draft EIS (MMS, 2002). The reader is referred to these documents for detailed discussion of likely exploration scenarios, timing of infrastructure development, assumed resource-recovery rates and quantities, assumed pipeline placement, resource production timeframes, and other information relevant to the development of resources that would occur under the Proposed Action (Alternative I).

2.1 The Proposed Action

MMS proposes to lease 517 whole or partial blocks covering 2.5 million acres (about 1.01 million hectares) of the U.S. OCS for oil and gas exploration, development, and production in the Cook Inlet, Alaska Planning Area. This area is located seaward of the State of Alaska submerged lands boundary and extends from 3 to approximately 30 miles offshore in water depths ranging from approximately 30 to 650 feet. This area, minus leased blocks, would be offered in each of two sales, Sale 191 and Sale 199. A separate decision will be made on holding each sale. The decision for Lease Sale 191 will be made in 2004 and the decision for Lease Sale 199 will be made in 2006. The MMS assumes that exploration will follow each of the sales, but that only a single field would be developed, producing approximately 140 million barrels of crude oil and 190 billion cubic feet of natural gas. Discovery of the field may result from exploration activities of either or both lease sales.

2.2 Action Area

The action area for purposes of this Opinion is defined as the Sale Area for Alternative 1, consisting of 2.5 million acres within lower Cook Inlet, Alaska, extending from approximately 58 degrees, 40 minutes N latitude to 60°16 minutes N latitude. Additionally, the action area will include those waters outside of Cook Inlet that may be impacted by oil spills originating within the Sale Area. This area includes waters of the Gulf of Alaska and Shelikof Strait. The direct and indirect effects of this action on listed species are expected to be confined to the action area.

2.3 Species Covered in this Opinion

In the Draft EIS, MMS determined that the proposed actions may adversely affect the endangered Steller sea lion, humpback whale, and fin whale. Other listed species were determined unlikely to be adversely affected. This determination was made for sperm, North Pacific right, and sei whales; primarily because those species do not typically occur within, near, or “downstream” of the proposed Cook Inlet lease sale area. NMFS concurs with these conclusions. Therefore this opinion will consider whether the proposed action is, or is not, likely to jeopardize the continued existence of Steller sea lions, humpback whales, and fin whales. The Cook Inlet population of beluga whale, *Delphinapterus leucas*, is present in the planning area for Sales 191 and 199, however this species is not listed under the ESA and is not considered in this opinion.

NMFS also recognizes that gray whales (*Eschrichtius robustus*) occur in the action area. Although gray whales were removed from the list of threatened and endangered species in 1994 (59 FR 31094), NMFS has a continuing obligation to monitor the status of this species. This biological opinion will not assess whether oil and gas leasing actions are likely to jeopardize the continued existence of gray whales; however, this opinion will include a general assessment of the effects of the action on gray whales as part of NMFS' continuing responsibility to monitor the status of the species.

2.4 MMPA Small Take Authorization

Section 101(a)(5)(A) of the MMPA directs the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals if certain findings are made and regulations governing the take are issued. This opinion will also address these authorizations. Such authorization may be accomplished through regulations and issuance of letters of authorization under those regulations, or through issuance of an incidental harassment authorization. These authorizations may be granted only if an activity would have no more than a negligible effect on the species (or stock), would not have an unmitigable adverse impact on the availability of the marine mammal for subsistence uses, and that the permissible method of taking and requirements pertaining to the monitoring and reporting of such taking are set forth to ensure the activity will have the least practicable adverse effect on the species or stock and its habitat.

NMFS anticipates certain activities associated with the proposed action may result in the taking of marine mammals (including endangered species), and that small take authorizations may be sought for those actions. The actions discussed in this opinion will constitute the expected range of actions for which these MMPA authorizations may be requested.

3.0 STATUS OF PROTECTED SPECIES AND ENVIRONMENTAL BASELINE

The following information on the status of the species provides the background necessary to understand the important issues related to this consultation. By regulation, environmental baselines for biological opinions include the past and present impacts of all state, Federal or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process (50 CFR §402.02)

3.1 Steller Sea Lions

The following description is derived from the NMFS 2002 biological opinion of scientific research permits for Steller sea lions (NMFS 2002a), unless otherwise noted.

3.1.1 Species Description and Distribution

The Steller sea lion (*Eumetopias jubatus*) was listed as threatened under the ESA on November 26, 1990. The listing followed a decline in the U.S. population of about 64% over the three decades prior to the listing. In 1997, the species was split into two Distinct Population Segments (DPSs) on the basis of demographic and genetic dissimilarities. The status of the western DPS was changed to endangered, and the status of the eastern DPS was left unchanged (62 FR 30772).

Steller sea lions are the only extant species of the genus *Eumetopias*, and are members of the subfamily Otariinae, family Otariidae, superfamily Otarioidea, order Pinnipedia. Steller sea lions are distributed around the rim of the North Pacific Ocean from the Channel Islands off Southern California to northern Hokkaido, Japan. Their distribution is probably centered in the Gulf of Alaska and the Aleutian Islands. Within their range, land sites used by Steller sea lions are referred to as rookeries and haulouts. Rookeries are used by adult sea lions for pupping, nursing, and mating during the reproductive season (generally from late May to early July). Haulouts are used by all ages classes of both genders but are generally not where sea lions reproduce. The continued use of particular sites may be due to site fidelity, or the tendency of sea lions to return repeatedly to the same site, often the site of their birth. Presumably, these sites were chosen and continue to be used because they protect sea lions from predators, some measure of protection from severe climate or sea surface conditions, and (perhaps most importantly) are in close proximity to prey resources.

Mating occurs on land (or in the surf or intertidal zones), males are able to defend territories and thereby exert at least partial control over access to adult females and mating privileges. The pupping and mating season is relatively short. In May, adult males compete for rookery territories. In late May and early July, adult females arrive at the rookeries, where pregnant females give birth to a single pup. Mating occurs about one to two weeks later. The gestation period is probably about 50 to 51 weeks.

The reproductive cycle includes mating, gestation, parturition, and nursing or post-natal care. The adult female's ability to complete this cycle successfully depends largely on the prey available to her.

3.1.2 Natural Factors Affecting Species

3.1.2.1 Predation on Steller Sea Lions

Killer whales and sharks prey on Steller sea lions. Anecdotal evidence of such predation is available, but the rate of predation and the potential impact on trends of the western population can not be determined with any measure of confidence. Given the reduced abundance of sea lions at multiple sites (rookeries and haulouts), predation by killer whales and other sources of natural mortality may exacerbate the decline in local areas.

3.1.2.1 Disease

Disease and parasitism are also potential causes of population decline, and evidence is available indicating that animals have been exposed to diseases and carry parasites. However, none of the evidence available at this time provides any indication that disease or parasitism caused the decline or are impeding recovery. Disease and parasitism are common in all pinniped populations and have been responsible for major die-offs, but such events are usually relatively short-lived and provide more evidence of morbidity or mortality. The ramifications of disease and parasitism remain a concern, both as primary and secondary problems, but do not appear to be significant impediments to recovery at this time or on the basis of the information currently available.

3.1.3 Potential Effects of Human Activities on Steller Sea Lions

A large number of human activities have contributed to the current status of the eastern and western populations of Steller sea lions. Some of those activities occurred in the past, ended, and no longer appear to affect either sea lion population; other activities ended, but had effects on the structure or composition of Steller sea lion populations that continue to hinder their ability to reverse their decline toward extinction. Still other human activities appeared to affect Steller sea lion populations after their decline and continue to affect them. The following section summarizes the principal phenomena that are known to affect Steller sea lion populations.

3.1.3.1 Commercial harvest

The Bureau of Commercial Fisheries awarded a contract to a commercial fishing company to develop techniques for harvesting sea lions in Alaskan waters in 1959. The two-fold purpose of the contract was to reduce the sea lion herds (because of alleged depredations on salmon and halibut fisheries) and to provide an economical source of protein for fur farms, fish hatcheries, and similar purposes. In 1959, 630 sea lion bulls were killed in an experimental harvest, but the harvest proved to be uneconomical. Another study was contracted by the Bureau of Indian Affairs of the Department of Interior to analyze the feasibility of a commercial sea lion harvest in Alaska. A total of 45,178 pups of both sexes were killed in the eastern Aleutian Islands and Gulf of Alaska between 1963 and 1972. Such harvests could have depressed recruitment in the short term and may have explained declines noted at some sites in the eastern Aleutian Islands or the Gulf of Alaska. These harvests do not appear to explain declines in other regions.

3.1.3.2 Subsistence harvest

The MMPA authorizes the taking of any marine mammal by Alaska Natives for subsistence purposes or for the purpose of creating and selling authentic native articles of handicrafts and clothing, given that it is not done in a wasteful manner. The ESA also contains provisions that allow for the continued subsistence use of listed species. Both the ESA and the MMPA contain provisions that allow regulation of the subsistence harvest of endangered, threatened, or depleted species, if necessary.

The subsistence harvest of Steller sea lions from 1960 to 1990 has been estimated at 150 animals per year, but the estimate was subjective and not based on any referenced data. This estimate is well below the levels observed in the 1990s), which seems inconsistent with the fact that sea lion populations are at their lowest recorded levels. In 1986, a working group organized by Dr. Ken Pitcher suggested that subsistence harvest had a potentially low impact on recent Steller sea lion population declines in Alaska. More recent estimates indicate a mean annual subsistence take of 448 animals from the Western U.S. stock (i.e., the endangered population) from 1992 to 1995. The majority (79%) of sea lions were taken by Aleut hunters in the Aleutian and Pribilof Islands. The great majority (99%) of the statewide subsistence take was from west of 144°W long. (i.e., the range of the western population).

Current subsistence harvests represent a large proportion of the potential biological removal that was calculated for the western stock of the Steller sea lion pursuant to the MMPA. However, subsistence harvests account for only a relatively small portion of the Steller sea lions lost to the population each year.

3.1.3.3 Pollutants

No toxicological studies have been performed on otariids to determine clinical ramifications of increasing contaminant burdens. However, Organochlorines have been associated with levels of health concern in other animals. Mink kit survival was compromised at approximately 8,000 ng/g lipid weight, immunosuppression in harbor seals was detected at average concentrations of 16,488 ±1023 ng/g lipid weight, and premature parturition in California sea lions was observed at burdens of 134,000 ng/g lipid weight.

Steller sea lion samples from the Bering Sea and Gulf of Alaska found that blubber PCBs ranged from 5,700-41,000 ng/g lipid in males, and 570-16,000 ng/g lipid in females. PCB concentration in males was orders of magnitude higher than other Arctic and Alaskan pinnipeds. DDT levels in males ranged from 2.8 to 17 ng/g lipid and in females from 0.19 to 6.5 ng/g lipid. For males and females aged 6 and 8 years of age, DDE levels were 5.4 and 1.8 ug/g lipid wt, respectively. Females were found to decrease the contaminant burden throughout life, relative to adult males, by dumping contaminants through lactation. Sea lions samples from the Bering Sea, Barren Islands, Prince William Sound, and St. George Island (Pribilof Islands) contained organochlorine levels in the blubber at 23000 +/-37000 ng/g, wet weight. There was large variance because of the large range of 1,800-110,000 ng/g. The high level at 110,000 ng/g was from a 1-2 year old male from the Bering Sea. Finally, the NMFS Northwest Center examined blubber samples from 24 Steller sea lions from southeast Alaska and report PCB levels of 630-9900 ng/g wet weight and DDT levels of 400-8200 ng/g wet weight, respectively. These studies indicate burdens are present in Steller sea lions that could be sufficient to produce health effects.

Concerns exist that the toxicity of contaminants may increase within an individual in negative energy balance, or nutritional limitation, as lipophilic contaminants such as PCBs are released as blubber stores are metabolized. While levels of circulating organochlorines did increase in the blood of harbor seals with high body burdens of organochlorines fasting for 15 days, immunological responses remained within normal ranges suggesting short-term fasting did not add an additional threat. Based on endocrine responses, however, seals with high levels of contaminants were likely to be less likely to adequately respond to stressful situations.

Several studies indicate that organochlorine pollutant residues in the tissues of California sea lions and harbor seals have been associated with reproductive failure. These pollutants have also been reported in association with impaired immune systems. A number of studies have also indicated relatively high concentrations of organochlorine compounds in Steller sea lions in Alaska, although these levels have not yet been associated with any changes in health or vital rates. Steller sea lions were undoubtedly exposed to oil after the Exxon Valdez oil spill, but no significant adverse effects of the oil were confirmed. At the present time, the available information does not support the hypothesis that contaminants are a significant contributor to the decline of sea lions, or an impediment to their recovery.

3.1.3.4 Oil and gas development

Previous biological opinions by NMFS for both the Bering Sea and Aleutian Islands and the Gulf of Alaska analyzed this factor under the heading of "human development". In each case it was noted that human development activities that result in aquatic habitat destruction or the release of contaminants and pathogens (e.g., mineral exploration and extraction, effluent discharges into the marine environment) could directly diminish the health and reproductive success of Steller sea lions or cause them to abandon feeding, breeding, or resting sites. Development and discharge proposals typically undergo ESA section 7 consultation during the Federal permitting process.

On October 15, 1993, NMFS completed a biological opinion on the leasing and exploration activities of the Minerals Management Service in the Cook Inlet/Shelikof Strait region (lease sale Number 149). The opinion concluded that such activities were not likely to jeopardize the continued existence of any listed or proposed species, nor were they likely to destroy or adversely modify critical habitats (NMFS 1993). In 1995, NMFS conducted another section 7 consultation with MMS and concluded that the lease sale and exploration activities for the proposed oil and gas Lease Sale Number 158, Yakutat were not likely to jeopardize the continued existence of any listed or proposed species, nor were the activities likely to destroy or adversely modify critical habitats.

Oil spills are expected to adversely affect Steller sea lions if they contact individual animals, haulouts, or rookeries when occupied, or large proportions of major prey populations. Potential effects could include: oil exposure, including surface contact and pelage fouling, inhalation of contaminant vapor, and ingestion of oil or oil-contaminated prey. Because the insulation of nonpup sea lions is provided by a thick fat layer rather than pelage whose insulative value could be destroyed by fouling, oil contact is not expected to cause death from hypothermia; however, sensitive tissues (e.g., eyes, nasal passages, mouth, lungs) are likely to be irritated or ulcerated by exposure to oil or hydrocarbon fumes. Oiled individuals probably will experience effects that may interfere with routine activities for a few hours to a few days; movement to clean water areas is expected to relieve most symptoms. Females returning from feeding trips may transfer oil to pups, which probably are more sensitive to oil contact.

The extent to which sea lions avoid areas that have been oiled is not known; individuals observed in Prince William Sound and the Gulf of Alaska after the Exxon Valdez oil spill did not appear to avoid oiled areas. Sea lions were sighted swimming in or near oil slicks, oil was seen near numerous haulout sites, and oil fouled the rookeries at Seal Rocks and Sugarloaf Island. All of the sea lions collected in Prince William Sound in October 1989 had high enough levels of metabolites of aromatic hydrocarbons in the bile to confirm exposure and active metabolism at the tissue level. But as noted above, no evidence indicated damage caused to sea lions from toxic effects of the oil.

Although Alaska is estimated to contain large petroleum resources on its outer continental shelf and in state waters, the only oil produced from Alaska's outer continental shelf to date has come from the Northstar facility in the Beaufort Sea. In the foreseeable future, the kind of extensive oil and gas activities that characterize the outer continental shelf of the central Gulf of Mexico is not likely for the Gulf of Alaska. Little or no oil and gas exploration or production is occurring or likely to occur soon on the Russian outer continental shelf area of the Bering Sea. The National Research Council recently concluded, therefore, that oil and gas activities in the Bering Sea have not significantly affected the Bering Sea ecosystem.

3.1.3.5 Disturbance

Several studies investigating the potential effects of oil and gas exploration and development on the Steller sea lion have noted human disturbance as a potential factor. Disturbance from aircraft and vessel traffic has extremely variable effects on hauled-out sea lions. Sea lion reaction to occasional disturbances ranges from no reaction at all to complete and immediate departure from the haulout area. The type of reaction appears to depend on a variety of factors. When sea lions are frightened off rookeries during the breeding and pupping season, pups may be trampled or even abandoned in extreme cases. Sea lions have temporarily abandoned some areas after repeated disturbance, but in other situations they have continued using areas after repeated and severe harassment. Permanent abandonment has been observed at areas in the Pribilof Islands that were subjected to repeated disturbance. A major sea lion rookery at Cape Sarichef was abandoned after the construction of a light house at that site, but then has been used again as a haulout after the light house was no longer inhabited by humans. The consequences of such disturbance to the overall population are difficult to measure. Disturbance may have contributed to or exacerbated the decline, although it is not likely to have been a major factor. At present, concern about the effects of disturbance focuses on disturbance as an impediment to the study of sea lions and other potential causes of the decline.

3.1.3.6 Entanglement in Marine Debris

Observations of Steller sea lions entangled in marine debris have been made throughout the Gulf of Alaska and in southeast Alaska, typically incidental to other sea lion studies. Two categories of debris, closed plastic packing bands and net material, accounted for the majority of entanglements. NMFS researchers surveyed numerous rookeries and haulout sites to evaluate the nature and magnitude of entanglement in debris on Steller sea lions in the Aleutian Islands. Of 30,117 animals counted (15,957 adults; 14,160 pups) only 11 adults showed evidence of entanglement with debris, specifically, net or twine, not packing bands or other materials. Entanglement rates of pups and juveniles appear to be even lower than those observed for adults. It is possible that pups were too young during the survey to have encountered debris in the water or that pups and juveniles were unable to swim to shore once entangled and died at sea. Some investigators have assumed that mortalities from entanglement in marine debris were not a major factor in the observed declines of Steller sea lions and estimated that perhaps fewer than 100 animals are killed each year.

3.1.3.7 Incidental Take of Steller Sea Lions in Fisheries

Steller sea lions have been caught incidentally in foreign commercial trawl fisheries in the Gulf of Alaska and Gulf of Alaska since those fisheries developed in the 1950s. From 1960 to 1990, incidental take may have accounted for over 50,000 animals, or almost 40% of his estimated total mortality due to various fishery and subsistence activities.

3.1.3.8 Intentional Take of Steller Sea Lions in Fisheries

Historically, Steller sea lions and other pinnipeds were seen as nuisances to the fishing industry and management agencies because they damaged catch and fishing gear and were thought to compete for fish. Sea lion numbers were reduced through bounty programs, controlled hunts, and indiscriminate shooting. Steller sea lions were also killed for bait in the crab fishery. Government sanctioned control measures and harvests stopped in 1972 with the introduction of the MMPA.

Anecdotal reports of shootings continue and a small number of prosecutions have occurred or are occurring. The full extent of incidental killing is undetermined and therefore should be considered a potential factor in the decline of sea lions at some locations.

3.1.3.9 Research

Steller sea lions have been captured, handled, wounded, and killed for scientific research for almost 50 years. In 1998, and estimated 48,000 Steller sea lions were disturbed by these investigations, 384 pups were captured, tagged, and branded, but no mortalities were reported.

3.1.4 Critical Habitat

Steller sea lion critical habitat is listed at 50 CFR §226.202. All major Steller sea lion rookeries and major haulouts in Alaska, along with associated terrestrial, air, and aquatic zones, are designated as critical habitat. Critical habitat includes the following areas:

- A terrestrial zone that extends 3,000 feet (0.9 km) landward from the baseline or base point of each major rookery and major haulout
- An air zone that extends 3,000 feet (0.9 km) above the terrestrial zone, measured vertically from sea level
- An aquatic zone that extends 3,000 feet (0.9 km) seaward in State and Federally managed waters from

the baseline or basepoint of each major haulout in Alaska that is east of 144° W long.

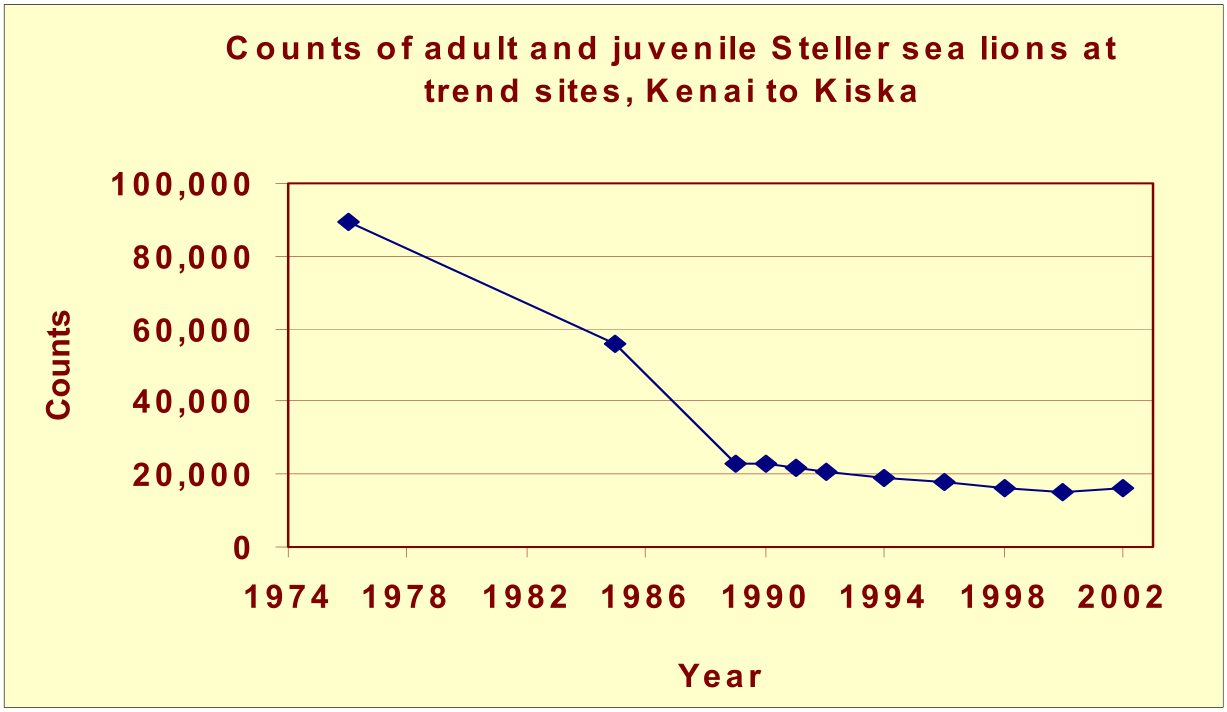
- An aquatic zone that extends 20 nm (37 km) seaward in State and Federally managed waters from the baseline or basepoint of each major rookery and major haulout in Alaska that is west of 144° W long.

Critical habitat also includes the Shelikof Strait foraging area in the Gulf of Alaska which consists of the area between the Alaska Peninsula and Tugidak, Sitkinak, Aiaktilik, Kodiak, Raspberry, Afognak and Shuyak Islands (connected by the shortest lines): bounded on the west by a line connecting Cape Kumlik (56°38′/157°26′W) and the southwestern tip of Tugidak Island (56°24′/154°41′W) and bounded in the east by a line connecting Cape Douglas (58°51′N/153°15′W) and the northernmost tip of Shuyak Island (58°37′N/152°22′W).

3.1.5 Population Status and Trends

Numbers of Steller sea lions declined dramatically throughout much of the species' range, beginning in the mid- to late 1970s (fig. 1,2). For two decades prior to the decline, the estimated total population was 250,000 to 300,000 animals. The population estimate declined by 50-60% to about 116,000 animals by 1989, and by an additional 15% by 1994. Final results from counts conducted in 1998 are not yet available, but preliminary results for trend sites between the Kenai Peninsula to Kiska Island indicate a decline of about 9% in nonpups since 1996, and 19% in pups since 1994.

Figure 1. **Counts of adult and juvenile Steller sea lions in the western DPS (by region) from late 1970s to 2002**



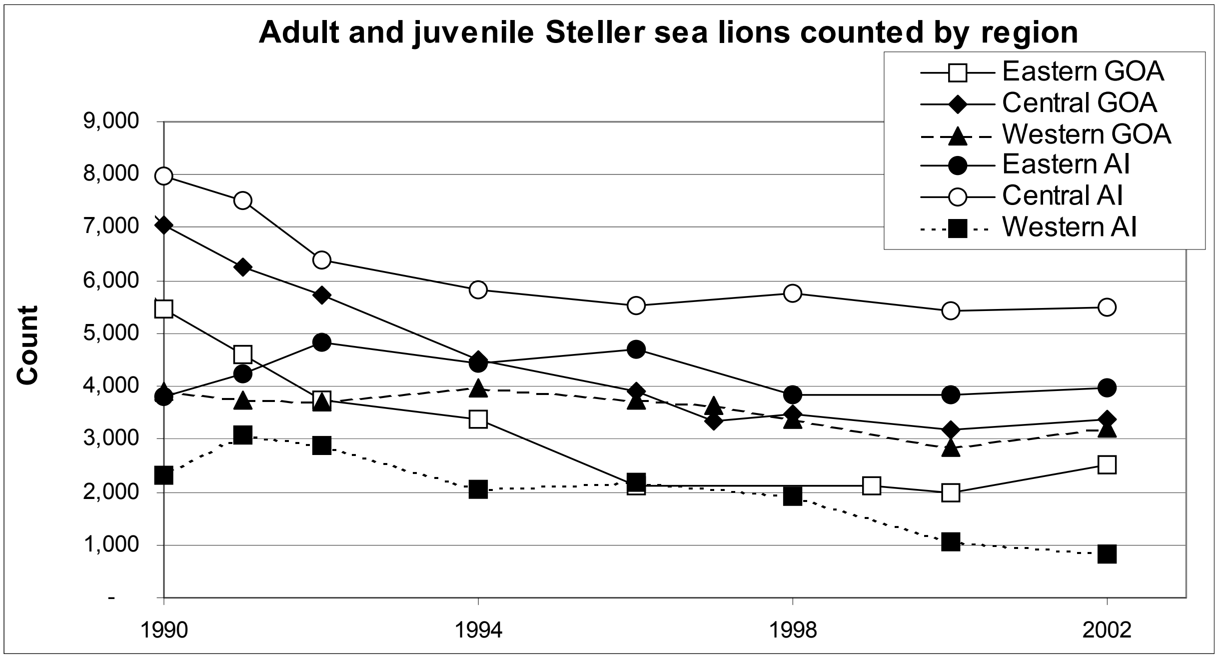


Figure 2. Counts of adult and juvenile Steller sea lions in the Russian part of the western DPS.

Population viability analyses indicate that the next 20 years may be crucial for the Steller sea lion, if the rates of decline observed in 1985 to 1989 or 1994 continue. Within this time frame, it is possible that the number of adult females in the Kenai-to-Kiska region could drop to less than 5000. Extinction rates for rookeries or clusters of rookeries could increase sharply in 40 to 50 years, and extinction for the entire Kenai-to-Kiska region could occur in the next 100-120 years.

3.2 Fin Whale

The following discussion of fin and humpback whales is as presented in NMFS 2001b, unless otherwise noted.

3.2.1 Description and Distribution

Fin whales are distributed widely in the world's oceans. In the northern hemisphere, most migrate seasonally from high Arctic feeding areas in summer to low latitude breeding and calving areas in winter. Other groups may remain year-round in a particular area, depending on food supply. The IWC's Scientific Committee recognizes two management stocks in the North Pacific: (1) the east China Sea, and (2) the rest of the North Pacific. NMFS considers stock structure in the North Pacific to be equivocal, and recognizes three stocks: (1) Alaska (northeast Pacific), (2) California/Oregon/ Washington, and (3) Hawaii.

Fin whales were reported as occurring immediately offshore throughout the North Pacific from central Baja California to Japan and as far north as the Chukchi Sea. Data indicate that some whales remain year-round at high latitudes and other areas such as the Gulf of California, migrating only short distances of 100-200 km (53.9-107.9 nm). In the Gulf of Alaska, fin whales appear to congregate in the waters around Kodiak Island and south of Prince William Sound. In recent years, small numbers of fin whales have been observed south of the Aleutian Islands, in the Gulf of Alaska (including Shelikof Strait), and in the southeastern Bering. Fin whale concentrations in the northern areas of the North Pacific and Bering Sea generally form along frontal boundaries, or mixing zones between coastal and oceanic waters, which themselves correspond roughly to the 200-m isobath. The coastal currents at the entrance to Cook Inlet (i.e., along the southern boundary f the Sale Area)provide a tremendous vehicle for nutrient mixing and year round foraging opportunities for many marine species, and prey presence and distribution is likely the reason for the presence of fin whales in these waters during the winter months (Mizroch et al. 2001)

Acoustic data collected from 1995 to 1999 from hydrophone arrays showed fin whales vocalizing in Alaskan waters during all seasons, with a peak in occurrence in midwinter.

3.2.2 Natural Factors Affecting Species

3.2.2.1 Life History Information

Fin whales become sexually mature between six to ten years of age, depending on density-dependent factors. Reproductive activities for fin whales occur primarily in the winter. Gestation lasts about 12 months and nursing occurs for 6-11 months. The age distribution of fin whales in the North Pacific is unknown. Calving and mating occur in late fall and winter. Specific breeding areas are unknown and mating is assumed to occur in pelagic waters, presumably some time during the winter when whales are in mid-latitudes. Fin whales commonly travel in herds ranging from between 6-12 individuals, to nearly 100 or more.

Foraging areas tend to occur along continental shelves with productive upwellings or thermal fronts. Fin whales tend to avoid tropical waters and pack ice, with the northern limit set by ice and the southern limit by warm water of approximately 15˚C (60˚F). Fin whales in the North Pacific feed on euphausiids, calanoid copepods, and schooling fish such as herring, pollock, Atka mackerel, and capelin. Euphausiids may be preferred prey, and competition may occur with other baleen whales or other consumers of these prey types. Natural sources and rates of mortality are largely unknown. NMFS has no records of fin whales being killed or injured by commercial fisheries operating in the North Pacific.

3.2.2.2 Diving and Social Behavior

Generally, fin whales make 5-20 shallow dives 13-20 seconds in duration followed by a deep dive of 1.5 to 15 minutes. Recorded dive depths reach 300 m. Dive depths and duration were significantly shorter at night than during the day, presumably in response to the daily vertical migrations of prey schools. An estimate of dive depth based on the acoustical properties of received fin whale calls was 525 m.

Fin whales are often found singly or in pairs, but also commonly form larger groupings greater than 3 individuals, particularly while feeding. Researchers have described group foraging behavior where 2-4 animals swam less than 50m apart in an echelon formation and lunged synchronously, right side down. They found that group composition was not stable: membership and group size changed frequently during feeding events.

3.2.2.3 Vocalizations and Hearing

Underwater sounds of the fin whale are one of the most studied *Balaenoptera* sounds. Fin whales produce a variety of low-frequency sounds in the 10-200 Hz band. The most typical signals are long, patterned sequences of short duration (0.5-2s) infrasonic pulses in the 18-35 Hz range. Estimated source levels are as high as 190 dB re 1 µPa. In temperate waters intense bouts of long patterned sounds are very common from fall through spring, but also occur to a lesser extent during the summer in high latitude feeding areas. Short sequences of rapid pulses in the 20-70 Hz band are associated with animals in social groups. Each pulse lasts on the order of one second and contains twenty cycles.

Particularly in the breeding season, fin whales produce series of pulses in a regularly repeating pattern. These bouts of pulsing may last for longer than one day. The seasonality and stereotype of the bouts of patterned sounds suggest that these sounds are male reproductive displays, while individual counter-calling data suggest that the more variable calls are contact calls. Some authors feel there is geographic differences in the frequency, duration and repetition of the pulses. As with other mysticete sounds, the function of vocalizations produced by fin whales is unknown. Hypothesized functions are the same as for the blue whale. Responses to conspecific sounds have been demonstrated in a number of mysticetes, and there is no reason to believe that fin whales do not communicate similarly. The low-frequency sounds produced by fin whales have the potential to travel over long distances, and it is possible that long-distance communication occurs in fin whales. Also, there is speculation that the sounds may function for long-range echolocation of large-scale geographic targets such as seamounts, which might be used for orientation and navigation.

No studies have directly measured the sound sensitivity of fin whales. Presumably fin whales are able to receive sound signals of the same frequency they are producing. In a study of the morphology of the mysticete auditory apparatus, it was hypothesized that large mysticetes have acute infrasonic hearing.

3.2.3 Population Status and Trends

The IWC began management of commercial whaling for fin whales in the North Pacific in 1969. Fin whales were fully protected from commercial whaling in 1976. Fin whales were listed as endangered under the ESA. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. Fin whales are listed as endangered on the IUCN Red List of Threatened Animals. Critical habitat has not been designated for fin whales.

Prior to exploitation by whaling vessels, the North Pacific population consisted of an estimated 42,000-45,000 fin whales. Between 1914 and 1975, over 26,040 fin whales were harvested throughout the North Pacific. Catches in the North Pacific and Bering Sea ranged from 1,000 to 1,500 fin whales annually during the 1950's and 1960's. However, not all Soviet catches were reported. In the early 1970s, the entire North Pacific population had been reduced to between 13,620 and 18,630 fin whales. The current status and trend of the fin whale population in the North Pacific is largely unknown. Based on the available information, it is feasible that the North Pacific population as a whole has failed to increase significantly over the past 20 years, despite an international ban on whaling in the North Pacific. The only contrary evidence comes from investigators conducting seabird surveys around the Pribilof Islands in 1975-1978 and 1987-1989. These investigators observed more fin whales in the second survey and suggested they were more abundant in the survey area. A survey for whales in the central Bering Sea in 1999 tentatively estimated the fin whale population was about 4,951 animals (95% C.I.: 2,833-8,653).

3.2.4 Potential Impacts of Human Activity

As early as the mid-seventeenth century, the Japanese were capturing fin, blue, and other large whales using a fairly primitive open-water netting technique. In 1864, explosive harpoons and steam-powered catcher boats were introduced in Norway, allowing the large-scale exploitation of previously unobtainable whale species. The North Pacific and Antarctic whaling operations soon added this “modern” equipment to their arsenal. After blue whales were depleted in most areas, the smaller fin whale became the focus of whaling operations and more than 700,000 fin whales were landed in the twentieth century.

There are no reports of fishery-related fin whale deaths, although conflicts between fin whales and drift gillnet fisheries may exist. Because of their size, strength, and distribution, it would probably be difficult to assess potential interactions between fin whales and fisheries; for example, fishermen have reported that large blue and fin whales usually swim through their nets without entangling and with very little damage to the net. It is possible that ship strikes affect all fin whale stocks but go unreported because injured or killed animals do not strand. In the North Pacific, one death due to ship collision was reported in 1991.

3.3 Humpback Whale

3.2.1 Species Description and Distribution

NMFS recognizes four stocks of humpback whales in the North Pacific basin, based on genetic and photo-identification studies: two Eastern North Pacific stocks, one Central North Pacific stock and one Western Pacific stock (Angliss et al., 2001).

Humpback whales typically migrate between tropical/sub-tropical and temperate/polar latitudes. Humpback whales feed on krill and small schooling fish on their summer grounds. The whales occupy tropical areas during winter months when they are breeding and calving, and polar areas during the spring, summer, and fall, when they are feeding, primarily on small schooling fish and krill. It is believed that minimal feeding occurs in wintering grounds, such as the Hawaiian Islands. Humpback whales summer throughout the central and western portions of the Gulf of Alaska, including Prince William Sound, around Kodiak Island (including Shelikof Strait and the Barren Islands), and along the southern coastline of the Alaska Peninsula.

Evidence indicates that the Kodiak Island/Shelikof Strait area is an important feeding area for humpback whales and that there may be discrete feeding aggregations of humpback whales in this area. 127 individuals were documented in the area between 1991 and 1994. Only 7 per 164 individuals identified during a recent 3-year photo-identification study from areas near Kodiak (127), the Shumagins (22), southeast of the Shumagins (8), and near Akutan Island (7) have been observed in Prince William Sound or southeast. Four of 127 Kodiak whales and 1 per 8 whales observed offshore were also seen in Prince William Sound. Two per 127 whales observed in Kodiak were observed in Southeast Alaska. No other matches were seen. None of the whales observed in Kodiak were observed also in California. Evidence from this study suggests that there may be a discrete (Angliss and Lodge, 2002) feeding aggregation of humpback in the Kodiak region. Aerial (1985) and vessel (1987) surveys, suggest that there are discrete groups of humpbacks in the Shumagins, but data are insufficient to characterize numbers or structure of humpbacks in this area.

Photo-identification data indicate that the vast majority of the whales that feed in the Gulf of Alaska region migrate to the Hawaiian Islands for the winter. Only three individuals were observed to travel to Mexico, and one traveled to the Bonin Islands area south of Japan. It is unclear what location(s) humpback whales that summer in the Kodiak region typically go to in the winter to calve and to breed Most of the humpback whales that winter in Japan have been observed in the summer feeding in the eastern North Pacific (in the feeding range of the purported Central North Pacific stock) but have not been observed in the Bering Sea and/or the Aleutian Islands, areas considered to be the historical feeding areas of the stock. However, this lack of sightings may be due to a lack of effort in identifying humpback whales west of Kodiak (Angliss and Lodge, 2002).

3.2.2.1 Life History Information

Humpback whale reproductive activities occur primarily in winter. They become sexually mature at age four to six. Annual pregnancy rates have been estimated at about 0.40-0.42 and female humpback whales are believed to become pregnant every two to three years. Cows will nurse their calves for up to 12 months. The age distribution of the humpback whale population is unknown, but the portion of calves in various populations has been estimated at about 4-12 per cent. The information available does not identify natural causes of death among humpback whales or their number and frequency over time, but potential causes of natural mortality are believed to include parasites, disease, predation (killer whales, false killer whales, and sharks), biotoxins, and entrapment in ice. Humpback whales exhibit a wide range of foraging behaviors, and feed on a range of prey types including small schooling fishes, euphausiids, and other large zooplankton. Fish prey in the North Pacific include herring, anchovy, capelin, pollock, Atka mackerel, eulachon, sand lance, pollack, Pacific cod, saffron cod, arctic cod, juvenile salmon, and rockfish. Invertebrate prey include euphausiids, mysids, amphipods, shrimps, and copepods.

Humpback whales form small unstable groups during the breeding season. During the feeding season they form small groups that occasionally aggregate on concentrations of food. Feeding groups are sometimes stable for long periods of times. There is good evidence of some territoriality on feeding grounds and on wintering ground. On the breeding grounds males sing long complex songs directed towards females, other males or both. The breeding season can best be described as a floating lek or male dominance polygyny.

3.3.2 Life History Information

3.3.2.1 Vocalizations and Hearing

Humpback whales produce a great variety of sounds. During the breeding season males sing long complex songs, with frequencies in the 25-5000 Hz range and intensities as high as 181 dB re 1 μPa. The songs appear to have an effective range of approximately six to 12 mi (10 to 20 km). Sounds are produced less frequently on the summer feeding grounds. Feeding groups produce distinctive sounds ranging from 20 Hz to 2 kHz, with median durations of 0.2-0.8 sec and source levels of 175-192 dB re 1 μPa. These sounds are attractive and appear to rally animals to the feeding activity.

Humpback whales respond to low frequency sound. Humpback whales have been known to react to low frequency industrial noises at estimated received levels of 115 - 124 dB re 1 μPa, and to conspecific calls at received levels as low as 102dB re 1 μPa.

3.3.3 Listing Status

The IWC first protected humpback whales in the North Pacific in 1965. Humpback whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the Marine Mammal Protection Act of 1972. Critical habitat has not been designated for the species.

3.3.4 Population Status and trends

An estimated 394 humpback whales constitute the western North Pacific stock (Angliss, et al. 2001). NMFS identified 127 individual humpback whales in the Kodiak Island region between 1991 and 1994 and estimated there were 651 whales in this region (95% CI:356-1,523). NMFS also estimated that 200 humpback whales regularly feed in Prince William Sound. Subsequently, based on mark-recapture analysis of photo-identification studies, several investigators concluded that the central North Pacific stock consists of at least 4,000 humpback whales (Angliss, et al., 2001). Other than these estimates of the size of the humpback whale population, the available information is not sufficient to determine population trends.

3.3.5 Potential Impacts of Human Activity

Six commercial fisheries within the range of both the western and central North Pacific stocks were monitored between 1990-2000: Bering Sea/Aleutian Island and Gulf of Alaska groundfish trawl, longline, and pot fisheries. One humpback whale was killed in the Bering Sea/Aleutian Island groundfish trawl fishery in 1998 and one in 1999. There are no records of humpback whales killed or injured in the fisheries in which fishers self report (Angliss and Lodge, 2002), but the reliability of such data are unknown. One entanglement is recorded in 1997 for a humpback whale in the Bering Strait (Angliss and Lodge, 2002). However, between 1996 and 2000, five entanglements of humpback whales from the Central North Pacific Stock were reported in Hawaiian waters. In Alaska, 20 humpback whales from this stock were reported entangled in fishing gear (gear types including crab pot, purse seine, shrimp pot, gillnet) and 2 were reported as struck by vessels. The Alaska Scientific Review Group (2001) states that 32 humpback whales were entangled in southeast Alaska in the past 5 years.

Humpback whales have been injured or killed elsewhere along the mainland U.S. and Hawaii. In 1991, a humpback whale was observed entangled in longline gear and released. In 1995, a humpback whale in Maui waters was found trailing numerous lines (not fishery-related) and entangled in mooring lines. No information is available on the number of humpback whales that have been killed or seriously injured by interactions with fishing fleets outside of U.S. waters in the North Pacific Ocean.

Humpback whales seem to respond to moving sound sources, such as whale-watching vessels, fishing vessels, recreational vessels, and low-flying aircraft. Their responses to noise are variable and have been correlated with the size, composition, and behavior of the whales when the noises occurred. Several investigators have suggested that noise may have caused humpback whales to avoid or leave feeding or nursery areas, while others have suggested that humpback whales may become habituated to vessel traffic and its associated noise. Still other researchers suggest that humpback whales may become more vulnerable to vessel strikes once they habituate to vessel traffic. Vessel strikes of humpbacks are not uncommon. Several records of such incidents occur for Alaskan waters; the NMFS's Alaska Region Marine Mammal Stranding database describes eight (8) such strikes between 1996 and 2001.

NMFS published a final rule on May 3, 2001, that established regulations applicable within waters within 200 nautical miles of Alaska that made it unlawful for a person subject to the jurisdiction of the U.S. to approach, by any means within 100 yards (91.4 meters) of a humpback whale. NMFS also implemented a "slow, safe speed" requirement for vessels transiting near humpbacks. Exemptions to the rule were for commercial fishing vessels during the course of fishing operations, for vessels with limited maneuverability, and for State, local, and Federal vessels operating in the course of official duty. This law was enacted to prevent disturbance that could adversely affect humpbacks and to reduce threats from whale watching activities. Likewise, the number of cruise ships entering Glacier Bay has been limited to reduce possible disturbance.

4.0 EFFECTS OF THE PROPOSED ACTIONS

The MMS DEIS describes multiple actions that could result from exploration actions associated with the proposed OCS Cook Inlet oil and gas lease sales. The major actions would include seismic profiling (high energy seismic geophysical survey and shallow hazard survey), exploration and delineation drilling (the MMS projects, for the purposes of the analysis within their DEIS, that two exploration wells would be drilled under Sale 191 leases, and another two wells under the following Sale 199). All such wells would be drilled using a single semi-submersible or jack-up rig. Support and logistic activities would include supply vessels and tugs and air support (1-2 helicopter trips per day). Muds and cuttings from drilling may be re-injected, shipped off-site, or discharged into the Inlet (this action is permitted by the Environmental Protection Agency). Oil spills are not likely during exploration, although MMS assumes that if a single field is discovered and developed, the probability for a spill in excess of 1,000 barrels of oil would be 19%.

The extent and characteristics of the in-air or underwater noise fields that will be generated during exploration is not possible to predict given the uncertainties of industry schedules, possible contributing noise sources, and propagation paths. The most significant potential impacts from underwater noise pertain to exposure to noise when the animal is well below the surface. This is because the noise level from a noise source when measured within a few feet of the surface is significantly lower than the noise level when measured at depths of 16.4 to 33 ft (5 to 10 m). Therefore, estimates of exposure must take into account the depth of the animal and the amount of time an animal spends at different depths (Ellison et al., 1993). For example, a marine mammal at the surface will experience a received noise level approximately 30 dB less than the received level for an animal at the same distance from the noise source, but at a depth of 33 ft (10 m)(Jensen, 1981).

In addition to disturbance, habituation and sensitization also are important when discussing the potential reactions by whales to multiple exposures to a noise stimulus. Habituation refers to the condition in which repeated experiences with a stimulus that has no important consequence for the animal leads to a gradual decrease in response. Sensitization refers to the situation in which the animal shows an increased behavioral response over time to a stimulus associated with something that has an important consequence for the animal. Richardson et al. (1990) provided an example of bowhead whales becoming habituated to the noises from dredging and drilling operations. Conversely, Richardson et al., (1995b) cited Walker (1949) as reporting that the responses of gray whale mother and calf pairs to a hovering helicopter seemed to increase the more the helicopter herded the mother and calf pairs into shallow water.

4.1 Effects of Seismic Surveys

A variety of devices and technologies exist which introduce energy into the water for purposes of geophysical research, bottom profiling, and depth determination. They are often characterized as high-resolution or low-resolution systems.
While these systems may be separately described based upon their physical characteristics, it may be less meaningful to separate the systems for purposes of assessing impact to bowhead whales.

Because high-resolution surveys are of lower energy and utilize higher frequencies which are generally do not travel as far as low frequency sound, these activities are less likely to have significant effects on endangered whales. Low-resolution systems such as 2-D and 3-D seismic put much more sound energy into the water and operate at low frequencies which overlap those used by baleen whales. Thus low-resolution systems have more potential to affect whales when used in open water. However, all these systems require a vessel platform (or several vessels) which themselves may impact whales. Additionally, while baleen whales appear to call and hear at low frequencies, they may detect and react to higher frequencies if they are produced at high levels (sound energy). Thus it is possible for a humpback or fin whale to be affected by and react to either system, depending on the nature of the vessel(s), the proximity to the whale, the frequency and energy of the system, and the sensitivity of the whale.

High-resolution systems, which are of much lower energy than low resolution systems, generally are conducted on tracts following a lease sale to evaluate potential shallow hazards to drilling or to other pipeline construction. Some high-resolution seismic surveys, such as those using airguns, emit loud sounds; but the sounds would not be as loud as sounds from deep-seismic surveys. Neither would the sound be likely to propagate as great a distance as sounds from deep seismic surveys. High-energy seismic surveys in Cook Inlet would likely only be feasible between May to mid-September.

Low-resolution surveys emit loud sounds, which are pulsed rather than continuous, and can propagate long distances from their source. Overall source levels of noise pulses from airgun arrays are very high, with peak levels of 240-250 dB re 1 μPa at 1 meter. However, most energy is directed downward, and the short duration of each pulse limits the total energy. Received levels within a few kilometers typically exceed 160 dB re 1 μPa (Richardson et al., 1995a), depending on water depth, bottom type, ice cover, etc.

4.2 Noise from Drilling

Drilling for oil and gas generally produces low-frequency sounds with strong tonal components. There are few data on the noise from conventional drilling platforms. Recorded noise from an early study of one drilling platform and three combined drilling production platforms found that noise was so weak it was almost not detectable alongside the platform at sea states of three or above. The strongest tones were at very low frequencies near 5 hertz, and received levels of these tones at near-field locations were 119-127 decibels re 1 μPa (Richardson et al., 1995).

4.3 Other Sources of Noise and Disturbance

During exploration, noise is also produced by supply vessels and low-flying aircraft, construction work, and dredging. Airborne sounds from aircraft and from high-speed motorboats are especially relevant to Steller sea lions. The transmission of aircraft sound to cetaceans or other marine mammals while they are in the water is influenced by the animal's depth, the altitude, aspect, and strength of the noise coming from the aircraft, as well as by bottom characteristics and other factors. Generally, the greater the altitude of the aircraft, the lower the sound level received underwater. Dominant tones from helicopters are generally below 500 hertz (Richardson et al., 1995). Ships produce noise due to sounds coming from engines, vibrating and rattling structural components, and, primarily, due to the cavitation of the propeller. Richardson et al. (1995) reported that the noise generated by a large container vessel, bulk carrier, or supertanker can exceed 190 decibels up to 205 decibels in the lowest frequencies. Tugboats and ferries produce noise up to 150-170 decibels at the source. The oil and gas that could ultimately be produced from the proposed lease sales are expected to be used for local consumption. Therefore, no additional tankering noise is predicted.

In the proposed Cook Inlet exploration and development scenario, an average of one to two helicopter flights per day are expected to originate from the Kenai/Nikiski area.

Other potential sources of noise, disturbance, and possible injury to threatened and endangered species during OCS oil and gas exploration include activities associated with abandonment of delineation wells. The casings for delineation wells can be cut mechanically or with explosives during the process of well abandonment. The use of explosives could result in injury or even death to threatened and endangered marine mammals in the area at the time of the explosions. Impacts to threatened and endangered species from well abandonment activities could probably be minimized or avoided if sufficient monitoring for such species occurred prior to the use of any explosives and protocols were implemented to ensure that such explosives were not used if such species were in areas where there was a potential for them to be adversely impacted by the explosives.

4.4 Effects Analysis on Cetaceans

In order to understand the biological significance of the risk of the effects of sound, it is necessary to determine how this risk might affect a population of marine mammals, starting with acoustic criteria. First, the marine mammal must be able to hear low frequency sound. There is no evidence that listed species, particularly the endangered baleen whales which are considered the most sensitive to low frequency sounds, can detect or respond to sounds that have dropped much below the level of ambient noise. Richardson et al. (1995) states that it is unlikely that man-made sounds with received levels slightly less than the background noise level in the corresponding band would cause disturbance even if faintly audible.

Second, the animal must experience a reaction to the low frequency sound that is more than momentary. Third, any effect from low frequency sound must involve a significant behavioral change in a biologically important activity, such as feeding, breeding, or migration, all of which are potentially important for reproductive success of the population.

4.4.1 Project Effects on Fin and Humpback whales (Mysticetes)

Moore and Clarke (2002) characterized the primary impacts of offshore oil and gas development to gray whales as ecological and toxicological. The vectors of such impacts were in-water noise from seismic and drilling activities, and oil spills. We believe these also represent the primary concerns regarding the impacts of Sale 191 on fin and humpback whales.

Feeding humpback whales, and, less likely, fin whales, in the areas near the Barren Islands and Kennedy and Stevenson Entrances could be adversely affected by noise from seismic exploration in leasing blocks in these areas. If they occurred, these effects would be localized and relatively short-term. Fin whales are vulnerable to the impacts of a large oil spill that enters Shelikof Strait at all seasons of the year. Humpback whales could be adversely affected by oil spilled in Kennedy or Stevenson Entrances, the southern portions of lower Cook Inlet, or the waters between Cook Inlet and Shelikof Strait, and by oil that entered (from one of the aforementioned regions) Kachemak Bay or especially Shelikof Strait during the late spring, autumn, and summer. Ingestion, surface contact with, and especially inhalation of fresh crude oil has been shown to cause serious damage and even death in many species of mammals.

Although there are no direct measurements of auditory thresholds in mysticetes, it generally is believed that they are adapted for hearing at low frequencies (below 1 kHz)(Ketten, 1994), and likely hear best in the frequency range of their calls (Myrberg, 1978; Turl, 1980). Baleen whale vocalizations range from below 10 Hz, to 25 kHz, with principal energy in the 50-300 Hz. Refer to the status of the species discussions for information on each listed species considered here.

4.4.2 Direct Effects

There is concern that manmade noise effects whales by raising background noise levels. Increased noise levels would mask important natural sound to varying degrees depending on the magnitude. High industrial noise levels in offshore waters during periods when whales are present may interfere with communication, cause physiological damage, or alter normal behavior. Marine mammals use calls to communicate and probably listen to natural sounds to obtain information important for detection of open water, navigation, and predator avoidance. Baleen whale hearing has not been studied directly. There are no specific data on sensitivity, frequency or intensity discrimination, or localization (Richardson et al., 1995a). For each species, the frequency range of reasonably acute hearing in baleen whales likely includes the frequency range of their calls. Most baleen whale sounds are concentrated at frequencies less than 1 kilohertz, but sounds up to 8 kilohertz are not uncommon (Richardson et al., 1995a). Based on indirect evidence, at least some baleen whales are quite sensitive to frequencies below 1 kilohertz but can hear sounds up to a considerably higher but unknown frequency. Most of the manmade sounds that elicited reactions by baleen whales were at frequencies below 1 kilohertz (Richardson et al., 1995a). Some or all baleen whales may hear infrasounds, sounds at frequencies well below those detectable by humans. Even if the range of sensitive hearing does not extend below 20-50 Hertz, whales may hear strong infrasounds at considerably lower frequencies. Based on work with other marine mammals, if hearing sensitivity is good at 50 Hertz, strong infrasounds at 5 Hertz might be detected (Richardson et al., 1995a).

There is also the concern that extremely loud noise might cause temporary or permanent hearing impairment of whales (Richardson and Malme, 1993). According to Richardson and Malme (1993), there is no evidence that noise from routine human activities (aside from explosions) would permanently cause negative effects to a marine mammal's ability to hear calls and other natural sounds. Given their mobility and avoidance reactions, it is unlikely that whales would remain close to a noise source for long. Also, baleen whales themselves often emit calls with source levels near

170-180 dB re 1 μPa comparable to those from many industrial operations. It is unknown whether noise pulses from nonexplosive seismic sources, which can be much higher than 170-180 dB re 1 μPa , are physically injurious at any distance. The avoidance reactions observed in some whales, such as bowhead and gray whales, to approaching seismic vessels normally would prevent exposure to potentially injurious noise pulses.

4.4.2.1 Changes to Hearing Sensitivity

Few data on the effects of non-explosive sounds on hearing thresholds of marine mammals have been obtained. However, it is generally accepted that received sound levels must far exceed the animal's hearing threshold for there to be any non-serious injury such as a temporary threshold shift (TTS; temporary reduction in hearing sensitivity). Received levels must be even higher for the risk of permanent threshold shift (PTS; permanent reduction in hearing sensitivity) to exist.

While some marine mammals, including whales, may tolerate continuous sound at some level, it is doubtful that many marine mammals would remain for long in areas where received levels of continuous underwater noise are 140 dB re 1 μPa or higher at frequencies to which the animals are most sensitive (Richardson et al. 1995). Marine geophysical (seismic) research using large airgun arrays would operate at frequencies used by baleen whales, and avoidance of active seismic vessels has been observed in some species, including bowhead and gray whales.

Air guns would be expected to have a source level exceeding 195 dB re 1 μPa at 1 meter. Humpback whales emit vocalizations at 180 dB re 1 μPa. Assuming a humpback or fin whale would be at least several hundred meters from the source, the received levels may be similar to those experienced by humpback whales in their day-to-day activities.

4.4.2.2 Auditory Interference or Masking

Masking refers to environmental noise that interferes with the ability of an animal to detect a specific sound signal. The masking occurs when the environmental noise frequencies are similar to the signal that the animal uses or when ambient levels are much higher than the signal. Masking in marine mammals is a function of the animal's hearing sensitivity, ambient noise source level, and animal distance from the source. Masking processes in baleen whales are difficult to study, and little or no data on hearing sensitivity are available for these species. Seismic noise has the potential to interfere with the detection of acoustic signals, such as communication calls, and other environmental sounds that may be important to mysticetes. Masking of their communication could disrupt social interactions or lead to disorientation if sounds were being relied upon to navigate.

Any adverse effects are expected to affect individuals temporarily, during exposure to the masking properties of the transmission signal. Richardson (1999)found bowhead whales continued their calls in the presence of airgun pulses, concluding that, given the relatively long gaps between short seismic pulses, only a small proportion of the (whale) calls could be masked by airgun pulses.

4.4.2.3 Behavioral Effects

Previous studies of mysticete responses to human-made noise have examined short-term behavioral responses to broadband industrial and recreational vessel noise extending from below 75 Hz to 1000 Hz.

Possible short-term reactions of mysticetes disturbed by human-made noise include interruption of feeding, resting, or social activities, and abrupt diving or swimming away (Finley, 1982; Calkins, 1983). Various studies and reported observations for a number of different mysticete species indicate variability in the responses to sounds of relatively high intensity (Bowles, et al. 1994; Malme et al. 1984; Maybaum, 1989; Mobley et al. 1988; Richardson et al. 1985; Richardson et al. 1995). In most instances, responses are affected by species, age and sex class, social context, habitat, habituation, and sound source characteristics.

There is variability in sensitivity and response to human-made noise between and within marine mammal species and a paucity of information about the consequences of short-term disruptions on marine mammals. Disturbance of marine mammals as a result of human-made noise, if intense enough, can result in interruption (at least briefly) of normal behavioral and social interactions with conspecifics, an increase in energy cost (whether or not feeding was disrupted or a fleeing response was elicited), and displacement to a less preferred habitat. Displacement also can have the benefit of removing the animal from a location where there might be more serious consequences had the animal remained (e.g., by reducing the masking effect of the human-made noise or the physiological stress that might continue if the animal remained close to the noise source).

Although there is little definitive information about the long-term effects of short-term disturbance reactions, isolated disturbance incidents probably have minimal or no lasting effects and the energetic consequences of most single disturbance incidents are likely insignificant. However, recurrent incidents of interrupted feeding, nursing and resting, if sufficiently frequent, can have negative effects on individual animals. The threshold at which the frequency and duration of disturbance that might initiate negative effects are not well known, and would likely depend on the species, area, feeding requirements, and reproductive status of the marine mammals involved. Animals most severely affected would likely be pregnant or lactating females and other animals subject to heavy natural energy drain.

A few marine mammal species exhibit extreme avoidance reactions to very low levels of industrial noise. Bowhead whales avoid airgun arrays by distances (up to 20 km) at which airgun sounds barely exceed background noise levels (LGL, 1998). Bowheads were observed to deflect from a seismic source in the Beaufort Sea at distances of 35 km, with received sound levels of approximately 120 dB re 1 µPa (Richardson, 1999). Also, gray whales avoid industrial sounds in their migratory pathway when received levels reach approximately 120 dB re 1 µPa (Malme et al. 1984). Experiments with migrating gray whales found that for animals exposed to industrial sounds placed directly in their migratory path, there was a 50% probability that a whale would avoid the area around the source when the received level was 116-124 dB re 1 µPa (Malme et al. 1983; Malme et al. 1984). Similar response levels were measured for bowhead whales (summarized in Richardson et al., 1995;

Richardson and Malme 1993). However, when similar noises were played to feeding humpbacks in Alaska, they did not show any response, even at received levels of 116 dB re 1 μPa (Malme et al., 1985) and humpback whales on the breeding ground did not stop singing during underwater explosions (Payne and Webb 1971). Many other species tolerate, at least for a few hours, continuous sound received at levels greater than 120 dB re 1 μPa (Richardson et al., 1995). Richardson et al. (1995) predicted that most marine mammals with hearing sensitivity below 100 Hz would not remain in areas where received levels of continuous noise remain at or above 140 dB re 1 μPa, unless hearing was previously impaired. These results lead to a cautionary rule-of-thumb that whales would show an avoidance response to man-made sounds at received levels greater than 120 dB re 1 μPa(Frankel and Clark, unpub. report).

Todd et al. (1996) found that humpback whales on feeding grounds did not alter short-term behavior or distribution in response to explosions with received levels of about 150dB re 1 μPa at 350Hz. However, at least two individuals were likely killed by the blasts and had extensive mechanical injuries in their ears (Todd et al., 1996). The explosions may also have increased the number of humpback whales entangled in fishing nets (Todd et al., 1996).

Humpback whales may respond the most to moving sound sources (for example, fishing vessel, low-flying aircraft). Long-term displacement of humpbacks from Glacier Bay and parts of Hawaii may have occurred due to vessel noise disturbance. Noise on their wintering grounds from the ATOC and the Navy's Low-Frequency Active Sonar program also are sources of concern for the central North Pacific stock (Angliss and Lodge, 2002). Conversely, a long-term assessment of the effects of research vessels in Cape Cod Bay found no evidence that vessel interactions exerted a long-term negative impact on mysticete species(Moore and Clarke, 2002).

Todd et al. (1996) have suggested that exposure to deleterious levels of sound may be related to rates of entrapment in fishing gear. Entrapment of humpbacks in fishing gear is a common problem off of the coast of Newfoundland and Labrador in the Atlantic (NMFS 2001b). Rates of entrapment between 1980 and 1992 were shown to vary between a low of 26 per year to a high of 200 (Todd et al., 1996). Coinciding with development-related noise (drilling and explosions) in one bay, rates of entrapment rose. Todd et al. (1996) concluded that exposure of the humpbacks to deleterious levels of sound may have influenced entrapment rates.

As for fin whales, the Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar research program (U.S. Navy, 2000. SURTASS LFA Sonar Final Environmental Impact Statement) indicates that these species do not exhibit obvious responses from the LFA source array of 18 projectors (received levels were from 120 to 155 dB re 1 μPa). Some cessation of humpback whale song and some apparent avoidance responses were displayed as a result of the LFA sound transmissions (received levels ranged from 120 to 150 dB re 1 μPa). Of the whales that did stop singing, "most" resumed singing within less than an hour of the possible response. Those humpback whales that did not stop singing sang longer songs during the period of LFA transmissions, and returned to baseline conditions after transmissions stopped.

Neither the California nor the Hawaii Marine Mammal Research Program found any overt or obvious short-term changes in the behavior of humpback whales or elephant seals in response to the playback of low frequency sounds associated with the North Pacific Acoustic Laboratory program (NMFS, 2001 b). In 1996, the behavioral responses of humpback whales to the playback of ATOC-like signals (maximum received level of 130 dB re 1 μPa) were studied. Humpback whales showed no overt responses to these ATOC playbacks (Frankel and Clark, 1998). By contrast, the single playback of a humpback whale feeding call provoked dramatic changes similar to those seen in previous playback experiments (Mobley et al. 1988). In 1996 and 1998, the behavior of humpback whales was observed from a shore-station on the north coast of Kauai while a low-frequency noise similar to the ATOC source was played (Frankel and Clark 1998) and the Kauai ATOC source was transmitting (Frankel and Clark 2000). Both experiments were conducted using similar methods. Observations of humpback whale movements were made during control (no playback or transmissions) and experiment conditions. Statistical analyses revealed some subtle changes in the behavior of humpback whales in response to the playback of ATOC-like sounds and to the transmissions of the ATOC Kauai source (Frankel and Clark, 1998; 2000). Both studies found that the distance and time between successive whale surfacings (segment length and segment duration) increased slightly with increasing received levels. This result is not what would be predicted if the animals had been stressed by the sound source. Rather, it would be expected that the animals would have remained at the surface longer because of the lower received levels there as longer dive durations would correspond to increased exposure to the sound source. No statistically significant changes were found in any other behaviors. The biological significance of the increase in distance and time between successive surfacings is not known.

The effects of substantial disturbance, which might result from a stationary and continuously noisy human activity near a marine mammal concentration area, could be mitigated in part by the degree to which the marine mammals habituate. Habituation effects can also limit the direct impact of a stimulus, in this instance the received levels. Habituation can be detrimental, however, if it leads to a lack of response to hazardous situations or results in masking. If animals fail to habituate and are excluded from an important concentration area or are subject to ongoing stress while in that area, then there could be long-term effects on the individuals and the population. Studies to date show that humpback whales at least respond with longer dive times to the ATOC source, and no change in distribution or abundance were observed during ATOC transmission.

4.4.3 Effects from Aircraft Traffic

Most offshore aircraft traffic in support of the oil industry involves turbine helicopters flying along straight lines. Underwater sounds from aircraft are transient. According to Richardson et al. (1995a), the angle at which a line from the aircraft to the receiver intersects the water's surface is important. At angles greater than 13° from the vertical, much of the incident sound is reflected and does not penetrate into the water. Therefore, strong underwater sounds are detectable while the aircraft is within a 26° cone above the receiver. An aircraft usually can be heard in the air well before and after the brief period while it passes overhead and is heard underwater.

Fixed-wing aircraft flying at low altitude often cause hasty dives. Reactions to circling aircraft are sometimes conspicuous if the aircraft is below an altitude of 300 meters (1,000 feet), uncommon at 460 meters (1,500 feet), and generally undetectable at 600 meters (2,000 feet). Reaction frequency diminished with increasing lateral distance and with increasing altitude. The effects from an encounter with aircraft are expected to be brief, and the whales should resume their normal activities within minutes.

Response to helicopters and airplanes varies with social context, distance from the aircraft, and aircraft altitude. Since the underwater noise generated by an aircraft is greatest within the 26 degree cone directly beneath the craft, whales often react to an aircraft as though startled, turning or diving abruptly when the aircraft is overhead. When whales are at the surface, they may detect the sound of an aircraft via air rather than water.

Overall, aircraft over-flights can cause a rapid short-term response. There is no evidence that this type of disturbance causes whales to avoid an area with aircraft activity; however, this specific subject is poorly-studied.

4.4.4 Discharges

Several operational discharges may be expected from oil and gas exploration activities. These include the disposal of drilling muds and cuttings, test fluids, cement slurry, sanitary wastes, bilge waters and deck drainage. These discharges must be authorized by the Environmental Protection Agency (EPA). The discharges are expected to result in minor changes in water quality within the mixing zone where the changes can be measured and, occasionally, outside the mixing zones (e.g., storm and surface water runoff and fire test). Even within the mixing zones, the changes are small. Because of the small sizes of the mixing zones, and the nontoxic nature of most of the pollutants discharged, impacts to threatened and endangered species are expected to be negligible. In addition, monitoring required by the EPA in their discharge permits will verify that water quality changes remain minor. Therefore, whales are not likely to be adversely affected by these discharges.

4.4.5 Effects of Oil Spills

MMS estimates the chance of a large (greater than or equal to 1,000 barrels) oil spill from exploratory activities to be very low. No exploratory drilling blowouts have occurred on the Arctic or the Alaskan OCS. Since 1971, industry has drilled approximately 172 exploration wells in the Pacific, 51 in the Atlantic, 10,524 in the Gulf of Mexico, and 97 in Alaska, for a total of 10,844 wells (Brajas, Howard, and Monkelein, 1999). From 1971 to 1999, there were 53 blowouts during exploration drilling (USDOI, MMS). There have been three (3) blowouts in Cook Inlet, all of them gas (MMS 2002). MMS predicts the probability for a blowout, based upon worldwide data, at 0.01 blowouts per billion barrels produced (MMS 2002).

While the probability of a blowout resulting in a major oil spill during exploration is remote, such an event would be difficult to control, contain, and recover, and be would likely to adversely affect listed species. Additionally, a consideration of the potential effects of an oil spill during construction is necessary to provide perspective on the latter phases of OCS leasing actions. Therefore, NMFS has included a discussion of oil spills within this opinion.

It is difficult to accurately predict the effects of oil on humpback and fin whales (or any cetacean) because of a lack of data on the metabolism of these species and because of inconclusive results of examinations of baleen whales found dead after major oil releases (Bratton et al., 1993; Geraci, 1990). Nevertheless, some generalizations can be made regarding impacts of oil on individual whales based on present knowledge. Oil spills that occurred while humpback and fin whales were present could result in skin contact with the oil, baleen fouling, ingestion of oil, respiratory distress from hydrocarbon vapors, contaminated food sources, and displacement from feeding areas (Geraci, 1990). Actual impacts would depend on the extent and duration of contact, and the characteristics (age) of the oil. Most likely, the effects of oil would be irritation to the respiratory membranes and absorption of hydrocarbons into the bloodstream (Geraci, 1990). If a marine mammal was present in the immediate area of fresh oil, it is possible that it could inhale enough vapors to affect its health. Inhalation of petroleum vapors can cause pneumonia in humans and animals due to large amounts of foreign material (vapors) entering the lungs (Lipscomb et al., 1994). Although pneumonia was not found in sea otters that died after the Exxon *Valdez* oil spill, inhalation of vapors was suspected to have caused interstitial pulmonary emphysema (accumulation of bubbles of air within connective tissues of the lungs). Bratton et al. (1993) reviewed the available literature on potential impacts of hydrocarbons on whales and theorized that impacts on the respiratory system of a bowhead whale confined by ice to a small, oil-contaminated area would be limited to: "*... irritation of the mucous membranes, .. irritation of the respiratory tract, and .. absorption of volatile hydrocarbons into the bloodstream through the bronchial tree with rapid excretion by the same route*." Geraci (1990) concludes that, depending on the concentration of vapors and duration of exposure, these effects may range from mild irritation to sudden death. Most of these studies acknowledge that volatile fractions of spilled oil would be expected to dissipate rapidly to the environment.

Whales may also contact oil as they surface to breathe, but the effects of oil contacting skin are largely speculative. Experiments in which *Tursiops* were exposed to petroleum products showed transient damage to epidermal cells, and that cetacean skin presents a formidable barrier to the toxic effects of petroleum (Bratton et al., 1993:). Humpback whales may ingest oil encountered on the surface of the sea during feeding, resulting in fouling of their baleen plates. Engelhardt (1987) noted that, "*baleen whales are vulnerable to ingesting oil when their baleen structures are coated,"* . The baleen plates of bowhead whales are fringed with hair-like projections made of keratin (Lambertsen et al., 1989). A laboratory study showed that filtration efficiency of bowhead whale baleen is reduced by 5% to 10% after contact with Prudhoe Bay crude oil (Braithwaite et al., 1983). It appeared that when baleen was fouled, viscous crude oil caused abnormal spacing of hairs which allowed increased numbers of plankton to slip through the baleen mechanism without being captured (Braithwaite et al., 1983). This loss of baleen filtration efficiency lingered for approximately 30 days. It was uncertain how such reduction would affect the overall health or feeding efficiency of individual whales. In contrast, another study concluded that the most severe effects of baleen fouling are short-lived and interfere with feeding for approximately 1-day after a single exposure of baleen to petroleum (Geraci and St. Aubin, 1983; 1985). The latter study tested baleen from fin, sei, humpback, and gray whales.

Consequences of whales contacting oil have not been well documented. Geraci (1990) reviewed a number of studies pertaining to the physiologic and toxic impacts of oil on whales and concluded there was no evidence that oil contamination had been responsible for the death of a cetacean. Cetaceans observed during the Exxon *Valdez* oil spill in Prince William Sound made no effort to alter their behavior in the presence of oil (Harvey and Dahlheim, 1994; Loughlin, 1994). Following the Exxon *Valdez* oil spill, daily vessel surveys of Prince William Sound were conducted from April 1 through April 9, 1989, to determine the abundance and behavior of cetaceans in response to the oil spill (Harvey and Dahlheim, 1994). During the nine surveys, 80 Dall's porpoise, 18 killer whales, and 2 harbor porpoise were observed. Oil was observed on only one individual, which had oil on the dorsal half of its body and appeared stressed due to its labored breathing pattern. However, many cetaceans were observed swimming in the area of the oil slick. A total of 37 cetaceans were found dead during and after the Exxon *Valdez* oil spill, but cause of death could not be linked to exposure to oil (Loughlin, 1994). Dahlheim and Matkin (1994) reported 14 killer whales missing from a resident Prince William Sound pod over a period coincident with the Exxon *Valdez* oil spill. Matkin (*in*: Loughlin, 1994) notes it is likely nearly all of the resident killer whales in Prince William Sound swam through heavily oiled areas, and that the magnitude of that loss was unprecedented. That study concluded there was a correlation between the loss of these whales and the *Valdez* spill, but could not identify a clear cause and effect relationship. Bratton et al. (1993) concluded that petroleum hydrocarbons appeared to pose no present harm to bowheads, but also noted that this conclusion was less than definitive because of disagreement over the degree of toxicological hazard posed by hydrocarbons.

Toxicity of crude oil decreases with time as the lighter, more harmful, aromatic hydrocarbons such as benzene evaporate. Acute chemical toxicity (lethal effects) of the oil is greatest during the first month following a spill. Sublethal effects may be observed in surviving birds, mammals, and fish for years after the spill. Sublethal and chronic effects include reduced reproductive success, blood chemistry alteration, and weakened immunity to disease and infections (Spies et al., 1996).

Contaminated food sources and displacement from feeding areas also may occur as a result of an oil spill. Rapid recovery of plankton would be expected due to the wide distribution, large numbers, rapid rate of regeneration, and high fecundity of plankton (USDOI, MMS, 1997). However, regeneration may not be rapid as some plankters, such as certain copepod species, may produce only one generation per year and breed for short periods of time.

However, postspill studies on cetaceans, specifically, are inadequate to confidently estimate the likelihood that serious injury to individuals of either of these two species would occur with oil exposure. Small spills are unlikely to have serious adverse effects on threatened or endangered cetaceans.

4.5 Effects on Steller Sea Lions

4.5.1 Airborn Noise and Disturbance to Haulouts/Rookeries

In specific areas such as the Barren Islands and Cape Douglas, the behavior of Steller sea lions could potentially be modified by noise and other disturbance from seismic surveys and the placement of drilling rigs during exploration and development. Aircraft, particularly helicopter disturbance, could potentially disturb sea lions on rookeries and haulouts in the Barren Islands and Cape Douglas. These effects could probably be avoided through flight practices aimed at avoiding such effects.

Calkins and Pitcher (1982) found that disturbance from aircraft and vessel traffic has extremely variable effects on hauled-out sea lions ranging from no reaction at all to complete and immediate departure from the haulout, i.e. a stampede. When sea lions are frightened off rookeries during the breeding and pupping season, pups may be trampled or, in extreme cases, abandoned. Juvenile and adult animals can also be injured during stampedes as animals run over each other or slide or crash into cliff facings or underwater rocks in their haste to escape the researchers. The flight response in pinnipeds has been described as "unrelenting and reckless" such that animals that are chased before capture (or which flee in response to the presence of researchers or low-flying aircraft) are placed in significant jeopardy, not only from the excessive metabolic heat generated from the flight itself, but also from a variety of potentially dangerous situations encountered in their escape attempts (Sweeney 1990). In two separate instances, captive sea lions jumping from elevations of 4-5 feet landed on their chest areas, rupturing the brachiocephalic vein located in the left shoulder area (Sweeney 1990). The hemorrhage resulting from this injury was fatal for one animal and severely debilitating in the other. Jaw fractures, which could impede feeding, are also a common result of the flight response. In the absence of adequate post-activity monitoring, such serious injuries or deaths would not be recorded.

Sea lions have temporarily abandoned haulouts after repeated disturbance (Thorsteinson and Lensink 1962), but in other situations they have continued using areas after repeated and severe harassment. Johnson *et al*. (1989) evaluated the potential vulnerability of various Steller sea lion haulout sites and rookeries to noise and disturbance and also noted a variable effect on sea lions. NMFS (2002) noted permanent abandonment of areas in the Pribilof Islands that were subjected to repeated disturbance. A major sea lion rookery at Cape Sarichef was abandoned after the construction of a light house at that site, but the sea lions used the site as a haulout after the light house was no longer inhabited by humans. The consequences of such disturbance to the overall population are difficult to measure. Disturbance may have contributed to or exacerbated the decline, although Federal, State, and private researchers familiar with the data do not believe disturbance has been a major factor in the decline of Steller sea lions.

The incidence of stampedes in response to aircraft approaches are not known. Researchers report that only a small percentage (less than 1%) of sea lions have been observed to be affected by approaching survey planes.

4.5.2 Effects of seismic (in-water)

Sea lions appear to use vocalizations as part of their social behavior and are able to hear well above and below water; however, there are no data on the response of sea lions to low frequency sounds. However, data from studies of the effects of low frequency sounds on elephant seals (*Mirounga* spp.), which are considered more sensitive to low frequency sounds than other pinnipeds (NMFS 2001b), suggest that elephant seals did not experience short-term changes in behavior in response to low frequency sounds. Richardson et al. (1995) also note the lack of data regarding pinnipeds and seismic, and state that their reactions are not predictable from "scaring device" observations.

4.5.3 Effects of oil spills

It is difficult to predict the potential impact of an oil spill on Steller sea lions. A large oil spill could harm or even kill adults, juveniles, or pups that inhale high concentrations of vapors from fresh oil, especially if they are already in a weakened physiological state. Skin irritation and eye damage could result from prolonged surface contact with oil. Such conditions can increase an individual's physiological stress and increase the likelihood of death of individuals that are highly contaminated or already weakened. Because they rely on their hair for thermal protection, sea lion pups are more vulnerable than are adults to oiling and could die if significantly oiled. Thus, a spill during peak pupping season could cause pup mortality if pups were oiled through contact with the beach or from their mothers. However, available data do not indicate such effects have typically occurred after previous spills, or if they have, that large numbers of individuals were affected.

The Exxon *Valdez* spill was, by many measures, a worst case scenario of an oil spill in terms of the Steller sea lion, in that it was a very large volume spill covering a wide area within the range of the western stock, persisted for long periods of time, reached important haul outs, and occurred during times when these animals were pupping and molting. No rookery habitat was oiled, however. During the initial spill in March 1989, 12 sea lion carcasses were recovered from the beaches of Prince William Sound, and an additional 16 sea lions collected from haulout sites in the vicinity of PWS and the Kenai coast (Loughlin, 1994). The highest levels of PAHs were in sea lions found dead following the oil spill. Sea lions collected seven months after the Exxon *Valdez* oil spill had levels of PAH metabolites in the bile consistent with exposure and metabolism of PAH compounds (Loughlin, 1994). However, since lesions associated with hydrocarbon contamination were not found in histological exams of any sea lion, there was no evidence of oil toxicity damage (Loughlin, 1994). The experience after the *Valdez* oil spill was that oil did not remain on haulouts or tend to remain on adults. Adults do not appear to be extremely susceptible to oil spills. However, long-term impacts on health, survival, or reproduction have not been well studied. The ongoing decline in Steller sea lions made it difficult to sort out potential population-level impacts of the Exxon *Valdez* oil spill. The National Marine Fisheries Service (1995) previously concluded that oil and other contaminants released into the aquatic environment could adversely affect the health, survival, and reproductive ability of Steller sea lions. A large spill could have adverse effects on individuals from both populations, but it is unlikely that such a spill could have a significant population level effect on the eastern population.

The pelagic waters of Shelikof Strait, an aquatic foraging area component of Steller sea lion critical habitat, could be contacted by an oil spill originating in the program area in Cook Inlet. However, the combined probabilities of a large spill actually occurring and contacting this or other Steller sea lion critical habitats are relatively low. The National Marine Fisheries Service (1995) concluded that any impact of an oil spill or other oil and gas-related activity that had an adverse effect on the production or availability of forage fish within sea lion critical habitats would have adverse impacts on this critical habitat.

4.6 Effects on Critical Habitat

This opinion is to assess whether the proposed action is likely to result in the adverse modification of critical habitat. Adverse modification means any direct or indirect alteration that appreciable diminishes the ecological function of critical habitat for the conservation of a listed species.

There are no critical habitats designated for humpback or fin whales. Critical habitat has been designated for the Steller sea lion, consisting of rookeries and major haul outs. Several Steller sea lion critical habitat sites occur in the sale area or "downstream" of some potential spills from that area. These include the Shelikof Strait foraging area, the Sugerloaf Island rookery, and major haul outs at Nagahut Rocks, Ushagat Island, Sud Island, Latax Rocks, and Shakun Rocks. Other major haul out/critical habitat sites occur along the south shoreline of the Alaska Peninsula: sites which may be impacted by oil spills originating in the Sale Area. The most likely vectors for any such modification would be oil spills which may alter these habitats physically, and acoustic disturbance (most likely due to aircraft).

The probability of these critical habitats becoming oiled has been considered by the MMS. Their spill trajectory analysis modeled spills from various release points in the sale area. Theoretical launch sites L6 and L7 were found to have the most southern extent of oiling, and because the critical habitat sites occur generally south of the Sale Area, would be expected to have the highest probability for contact. Cape Douglas has the highest annual probability for contact; 56% for a spill originating at L6 reaching this area within 3 days; while the Barren Islands would have up to a 44% chance of contact. These probabilities are associated with Alternative I. Adoption of the alternative deferral areas would be expected to reduce these probabilities of contact; the Barren Island Deferral would reduce the chance of contact from a spill originating at L6 by 26-29% within 3, 10 and 30 days (C. Smith[1]). Other sea lion critical habitats to the south and west of the Sale Area (downstream effects) have probabilities for contact varying between less than 0.5% to 19 percent. These are *conditional* probabilities (e.g. they assume a spill has occurred) and use the launch point with the highest probability of contacting sea lion sites. They may, then, be seen as conservative estimates, if the spill analysis itself is correct. The MMS estimates the probability for a spill in excess of 1,000 barrels during production to be 19% for their analysis. The combined probability of a spill occurring and also reaching one or more critical habitat sites is small.

---

[1]Smith, C. 27 February, 2003. MMS Alaska OCS Region. Personal commun.

Additionally, the physical conditions at these sites make them less likely to become oiled, or for oil to persist. The rookery and haul outs are predominately bedrock sites on shoreline promontories (exposed rocky shores) which do not allow oil to be entrained into beach structure (sands and cobble). Oil is held offshore by waves reflecting off the steep shoreline. Oil persistence will be short, and will be a function of the wave energy. Oil would be removed in days (RPI, 1986). Nonetheless, any oil reaching these sites would be especially troubling. Pups present on rookeries would be at highest risk. Any oiling to the fur of young sea lions could increase their transfer of heat to the environment, increasing metabolic demands. Sea lions metabolic demands are also elevated during molting, and oiling and harassment associated with spill response actions could have adverse effects. There is, in fact, some question as to whether response actions should be directed at these sites, given the aggressive nature of the animals, concerns over loss of mother/pup pairs, the physiology of the sea lion, and the general resistance to oiling of high energy sites. NMFS believes any reasonable measures to prevent these sites from becoming oiled should be adopted by MMS. Towards this end, we are advocating certain deferral areas, as presented in the DEIS, as Conservation Recommendations.

Aerial overflights could diminish the ecological value of these habitats. NMFS believes such impacts would be largely avoidable, and that specific Notices to Lessees from MMS, amplified as Conservation Recommendations within this opinion, should be effective.

5.0 CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR 402.02 (Interagency Cooperation on the Endangered Species Act of 1973, as amended): "…those effects of future State or private activities not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation." Reasonable foreseeable future federal actions and potential future Federal actions that are unrelated to the proposed action are not considered in the analysis of cumulative effects because they would require separate consultation pursuant to section 7 of the ESA. Cumulative effects are usually viewed as those effects that impact the existing environment and remain to become part of the environment. These effects differ from those that may be attributed to past and ongoing actions within the area since they are considered part of the environmental baseline. Additionally, most structures and major activities on the OCS require Federal authorizations from one or more agencies, such as the MMS, Army Corps of Engineers, and the Environmental Protection Agency. Such projects must consult under the ESA, and are therefore not addressed here as cumulative impacts.

5.1 Cumulative Effects on Steller Sea Lions

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Past and present impacts of non-federal actions are part of the environmental baseline. The following discussion is derived from NMFS (2001a), unless otherwise noted.

5.1.1 Subsistence Harvest

The subsistence harvest of sea lions by Alaska Natives results in direct takes that are expected to continue into the foreseeable future. These takes represent the highest level of known direct mortality from an anthropogenic source. Recent estimates of this harvest range from a high of 549 in 1992 to a low of 164 in 1997, with a mean of 353. The primary areas of subsistence harvest are the Pribilof Islands, Kodiak Island, and the Aleutian Islands. The overall impact of the subsistence harvest on the western population depends upon the number of animals taken, their sex and age class, and the location where they are taken. As with other sources of mortality, the significance of subsistence harvesting may increase as the western population of sea lions decreases in size unless the harvesting rate is reduced accordingly. The future subsistence harvest may contribute to localized declines of sea lions and/or impede recovery if the harvest is concentrated geographically.

5.1.2 State-managed Commercial Fisheries

State-managed fisheries affect sea lions through both direct and indirect mechanisms. Direct impacts include sea lions killed inadvertently in trawls, seines, or gill nets, as well as short term nonlethal effects such as disturbance of sea lion haulouts, vessel noise, entanglement in nets, and preclusion from foraging areas due to active fishing vessels and gear. Indirect impacts include the hypothesis that fisheries may compete with sea lions for common prey. In particular, walleye pollock, Pacific salmon, Pacific cod, and Pacific herring are consumed with relatively high frequency by the western population of sea lions. State managed groundfish harvesting can cause dense schools of fish to scatter, reducing sea lion prey density and decreasing the value of foraging habitat. Similarly, short term intensive fishing effort targeted on spawning aggregations of herring and on high densities of salmon at stream or river outlets may decrease the opportunities for sea lions to forage efficiently. As a result, individual sea lions may have to expend more time and energy to consume the same quantity of fish.

The state managed herring and salmon fisheries are short in duration and relatively small in scale. However, despite the smaller scope and scale of these state managed fisheries relative to federally managed fisheries, interactions with state managed fisheries may be a more important factor for Steller sea lions than previously realized. Recent information on sea lion foraging patterns indicates that pups, juveniles, and breeding aged adults spend the majority of their time in areas within 10 nm of shore, suggesting that they may rely heavily on near shore prey. Preferential use of near shore habitat by foraging sea lions implies that they are more susceptible to interactions with state managed fisheries than they appeared to be previously.

NMFS expects the existing state managed fisheries to continue into the foreseeable future. Likewise, NMFS expects the direct and indirect effects of state managed fisheries on Steller sea lions to continue into the foreseeable future. With regard to direct effects, state managed fisheries are likely to continue to account for an annual mortality of approximately 30 Steller sea lions, based on current levels of direct mortality. There are no available estimates of the frequency or severity of nonlethal takes in state managed fisheries, but presumably nonlethal takes will continue at current levels. Regarding indirect effects, NMFS concludes based on available information that state managed fisheries for pollock, cod, herring, and salmon are likely to continue to compete for fish with foraging Steller sea lions. Given the importance of near shore habitats to sea lions, this competition for fish may have consequential effects. Specifically, these interactions may contribute to nutritional stress for sea lions, and may reduce the value of the marine portions of designated sea lion critical habitat. State managed fisheries will continue to reduce the abundance of preferred sea lion prey within these marine foraging areas and may alter the distribution of certain prey resources in ways that reduce the foraging effectiveness of sea lions. Therefore, state managed fisheries (particularly for herring, salmon, and groundfish) may contribute to the continued decline of the western population of Steller sea lions and may reduce the prospects for survival and recovery. However, the causes of the current decline, and the extent that the contributing factors play in the decline are largely unknown.

5.1.3 State-managed Sport Fisheries

Meeting public demand for recreational fishing opportunities in Alaska while at the same time maintaining and protecting fishery resources has become a significant challenge for ADF&G. Increasing tourism and continued population growth lead to increased pressure on existing sport fisheries and development of new fisheries.

The sport fishery harvests about 1% of the annual Alaska total fish harvests. Sport fishery harvests would be expected to continue in relatively low amounts in the future. The nature of most of the fisheries is slow removal rates and dispersed catch. The most concentrated catches are in the salmon fisheries, however, many of these (such as the Kenai fisheries) take place upriver outside of foraging areas for Steller sea lions. For these reasons, future state managed sport fisheries will not contribute measurably to the total cumulative effects of state, tribal, local, and private actions on Steller sea lions.

5.1.4 Subsistence Harvest of Groundfish

Subsistence hunting and fishing are important to the economies of many families and communities in Alaska. The subsistence fishery harvests about 2% (8,000 mt) of the annual Alaska total fish harvest. Although subsistence harvests are likely to continue into the future, and possibly grow if population increases, the amount taken for consumptive uses will remain very small compared to the commercial catch of fishery resources and will not contribute measurably to the total cumulative effects on Steller sea lions.

5.1.5 Illegal Shooting of Sea Lions

The mortality level from illegal shooting of sea lions has been estimated to be at least 50 animals per year. Despite education and enforcement efforts, NMFS expects this level of mortality to continue for the foreseeable future.

5.1.6 State Oil and Gas Leasing

Oil claims were staked at Katalla approximately 50 miles south of Cordova in 1896. Oil was discovered there in 1902. An on-site refinery near Controller Bay produced oil for over thirty years. The refinery burned down in 1933 and was not replaced. Exploration in Cook Inlet began in 1955 on the Kenai Peninsula in the Swanson River area, and oil was discovered in 1957 which sparked an oil rush in south central Alaska. Today, a number of active fields produce oil in Cook Inlet, all of which is processed at the refinery at Nikiski on the Kenai Peninsula. Estimated oil reserves in Cook Inlet are 72 million barrels of oil. Currently there are additional lease sales planned through 2005 for the Cook Inlet area. Much of the current State oil and gas development in Cook Inlet lies in waters north of the normal range of the Steller sea lion.

5.1.7 Vessel and Aircraft Activity

Disturbance from vessel and aircraft traffic has variable effects on sea lions ranging from no reaction at all to temporary departure from haulouts and rookeries and even abandonment of haulouts and rookeries. These effects stem primarily from noise emanating from cruise ships, ferries, small boats, and aircraft. The consequences of such disturbance to the overall sea lion population are difficult to measure. Disturbance may have contributed to or exacerbated the decline of Steller sea lions, although it likely has not been a major factor in the decline. NMFS expects disturbance from vessels and aircraft to continue in the future at levels comparable to the present.

5.1.8 Human Population Growth

Alaska has the lowest population density of all of the states in the United States. Although Alaska's population has increased by almost 50 percent in the past 20 years, most of that increase has occurred in Anchorage and Fairbanks.

In general, as the size of human communities increases, there is an accompanying increase in habitat alterations and impacts on landscapes and biota. As areas are modified for the construction of housing, roads, commercial facilities, and other infrastructure, native plants and animals are displaced and waste disposal needs increase.

Our assessment of cumulative effects to Steller sea lions indicates that such effects are relatively small at present, and are managed or monitored through on-going actions by NMFS. The proposed action is not likely to add significantly to these cumulative effects.

5.2 Cumulative Effects on Fin and Humpback Whales

Because humpback and fin whales are highly migratory and occupy vast home ranges, it is difficult to assess cumulative effects to these animals. These species may be impacted by commercial fisheries (incidental take and gear interaction), and NMFS expects commercial and recreational fisheries managed by Hawaii, Alaska, and other Pacific coasts states to continue within the foreseeable future. Due to lack of good data, it is not possible to accurately estimate injury and mortality rates to fisheries interactions. NMFS expects whale watching operations, vessel traffic, aircraft and helicopter tours, and research activities to continue for the foreseeable future, mostly in the winter in Hawaii and summer in Alaska. The best scientific and commercial data available provide little specific information on any long-term effects of these potential sources of disturbance on whale populations. Information on the effects of repeated harassment by research activities, vessel traffic, and whale watchers is also lacking. It appears that the number of humpback whales is not decreasing and there is insufficient information on the trends of fin whales. Therefore, at the present time, continuation of these activities would not appear to add to the cumulative effects to the point at which the conclusions of this opinion would be altered.

5.3 Incremental Step Consultation

This Opinion addresses the incremental step of leasing and exploration in the Cook Inlet OCS planning area. For the Federal agency to proceed with the incremental step, there must be a reasonable likelihood the entire action will not violate section 7 (a)(2) of the ESA (50 CFR 402.14(k)). Therefore, NMFS is providing its views on the subsequent phases of development and production, should commercially-viable discoveries of oil occur.

The MMS provides a scenario for development and production in the DEIS which is similar to that of exploration. It would involve the construction of a single production platform and two 25 mile pipelines to shore: one for oil and one for gas. The pipelines are not expected to require dredging. The oil and gas produced are expected to be refined and consumed in-State, with no export.

Activities during development and production, like those occurring during exploration, will result in noise, altered habitat, and adverse effects on behavior, distribution, and abundance of individuals or populations occurring in or adjacent to the sale area. In addition, cleanup activities associated with any oil spill may result in disturbance.

Oil or other petroleum products released during development or production may cause adverse effects on individuals either through direct contact or indirectly as a result of effects on prey populations or important habitats. Contaminants, other than crude oil, such as drilling muds and cuttings, are not expected to cause significant effects, because they are likely to become rapidly diluted near the point of release. Moreover, the Environmental Protection Agency's discharge permits may require re-injection of muds and cuttings whenever possible, eliminating these discharges.

Noise effects associated with development and production activities on endangered whales would be similar to those described earlier. Whales could exhibit avoidance behavior from noise associated with aircraft traffic, supply vessels, drilling operations or seismic-survey vessels.

Cleanup activities associated with an oil are likely to result in disturbance to Steller sea lions and whales. If an oil spill does occur, it is likely that large numbers of personnel, vessels, and aircraft will be present and conducting cleanup operations in the area. Disturbance effects on the sea lions and whales are expected to persist for the duration of cleanup operations during periods when these animals are present in the spill area. The effects of oil spills on these species have been discussed previously in this document.

5.3.1 Incremental Step Conclusion

The effects of OCS production activities have been described. The effects from an encounter with aircraft generally are brief, and the marine mammals should resume their normal activities within minutes. Sea lions and whales exposed to noise-producing activities most likely would experience temporary, nonlethal effects. Some avoidance behavior could persist up to 12-24 hours. Marine geophysical (seismic) exploration is of particular concern with respect to fin and humpback whales, although any impacts are most likely associated with behavioral changes (harassment) rather than injury or death.

Most sea lions and whales exposed to spilled oil are expected to experience temporary, nonlethal effects from skin contact with oil, inhalation of hydrocarbon vapors, ingestion of oil-contaminated prey items, baleen fouling, reduction in food resources, or temporary displacement from some feeding areas. A few individuals may be killed as a result of exposure to freshly spilled oil. However, the combined probability of a spill occurring and also contacting sea lion or whale habitat during periods when they are present is considered to be low, and the percentage of the stock or population of these animals so affected is expected to be very small.

The probability of an oil spill increases as more oil fields become active. MMS projects a 19% probability for a spill in excess of 1,000 barrels for the production scenario. While this estimate is significant, the combined probability that a spill would occur, the probability for a spill to occur or persist during periods when sea lions or whales are present, and the probability that oil would move into areas used by these species appears small. Significant adverse affects would only be expected if all of these low-probability events occurred at the same time.

5.4 Summary Effects of the Action

This Biological Opinion has considered the effects of the oil and gas leasing and exploration on the Outer Continental Shelf portion of Cook Inlet, Alaska on ESA-listed species and critical habitat. These actions are likely to affect sea lions and whales due to vessel operations, marine geophysical (seismic) exploration, aircraft traffic, and drilling noises from various structures. The probability of a large oil spill is remote during exploration, but was assessed due to the pronounced effects it might have on the these species and the higher probabilities associated with subsequent development and production phases.

Elevated noise levels in the marine environment could alter the hearing ability of marine mammals, causing temporary or permanent threshold shifts. There is, at present, insufficient information on the hearing ability and sensitivities of baleen whales or Steller sea lions to adequately describe this potential. However, information suggests most continuous and impulsive underwater noise levels would be at levels or durations below those expected to injure hearing mechanisms. Nonetheless, marine seismic activities may present concerns with respect to hearing, and should be closely conditioned and monitored to avoid these effects.

5.4.1 Gray Whale Concerns

The Eastern north Pacific stock of the gray whale, *Eschrichtius robustus*, occurs in and near the Sale Area. These whales overwinter in Pacific waters off California and Mexico, and migrate northward each year to the Bering, Chukchi, and Beaufort Seas (Angliss et al., 2001). Previously listed as an endangered species, this stock is now considered to be recovered, and was removed from the Endangered Species list in 1994. The minimum population estimate for this stock is 26,635, and the stock may be increasing at an annual rate exceeding 2 per cent (ibid.). Gray whales reach the Shelikof Strait/lower Cook Inlet region sometime in late March to April. The southward migration may reach these waters during November, and gray whales are often spotted off Kodiak Island well into December. The migration route of the gray whale closely follows the coastline, although this route splits near the Sale Area; some whales moving along the outside of Kodiak Island and others moving through Shelikof Strait. NMFS has no records of gray whales summering within the Sale Area, nor of any feeding by gray whales in these waters. However, several sources (reported in MMS 2002) have identified gray whales summering and feeding in California, Oregon, and Washington; and it is likely similar behavior occurs in the Gulf of Alaska.

The discussion and assessment of the potential effects of Sale 191 on fin and humpback whales is probably very applicable to the gray whale. All of these are baleen whales and, to some extent, would be expected to display similar reactions to OCS exploration activities and oil spills. Thus, the discussion of impacts/effects to fin and humpback whales in this opinion is broadly representative of gray whales. Because most gray whales would occur outside (south) of the Sale Area, and would be migrating past the area, it is likely they would experience lesser effects of the sale than fin or humpback whales. Gray whales within the Eastern North Pacific stock are exposed to considerable amounts of human activity, including oil and gas operations in California, a myriad of commercial shipping and fishing activities, and various whale watching and research activities. The recovery of the gray whale population in the face of long-term exposure to human activities along the North American coast suggests a strong degree of tolerance to such activities (Moore and Clarke, 2002).

NMFS finds no evidence of likelihood that proposed Sales 191 or 199 would present significant consequence to the conservation of this stock.

6.0 CONCLUSIONS

After reviewing the current status of the Steller sea lion, fin whale, and humpback whale; the environmental baseline for the action area; the biological and physical impacts of oil leasing and exploration; and cumulative effects, it is NMFS's biological opinion that the proposed MMS oil and gas lease sales 191 and 199 in Cook Inlet, Alaska are not likely to jeopardize the continued existence of the fin whale, humpback whale, or Steller sea lion, nor result in the adverse modification of critical habitat.

7.0 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

This opinion does not include an incidental take statement at this time. Upon issuance of regulations or authorizations under Section 101(a)(5) of the Marine Mammal Protection Act and/or its 1994 Amendments, NMFS will amend this opinion to include an incidental take statement(s).

8.0 CONSERVATION RECCOMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The National Marine Fisheries Service and the Minerals Management Service should implement the following measures for these purposes:

1. MMS should adopt proposed Alternatives III and IV, as presented in the December 2002 DEIS. These alternatives would defer from leasing certain tracts near the Barren Islands and offshore of the lower Kenai Peninsula. The use of the Sale Area by endangered whales and the Steller sea lion increases to the south, and several designated critical habitats exist within these deferral areas. NMFS believes these deferrals would reduce general disturbance to these species, and lessen the risk to critical habitat due to aircraft noise, geophysical seismic operations, and to an extent, oil spills.

2. All aircraft should maintain flight separation distances of 1,500 feet vertical and 0.5 miles horizontal over all Steller sea lion haulouts and rookeries (identified in 50 CFR 226.202).

3. The MMS should initiate or continue research on the distribution and habitat use of the lower Cook Inlet/Shelikof Strait area by humpback and fin whales.

4. The MMS should continue to provide Information to Lessees and Lease Stipulations intended to reduce impacts to the endangered species and marine mammals.

5. Upon learning of the unauthorized take of any endangered species or impacts to critical habitat which occurs as a result of OCS exploratory activity, MMS should immediately notify the assistant Regional Administrator for Protected Resources at (907) 586-7235 of this taking to determine the appropriate and necessary course of action.

6. Multiple seismic operations should not work within the same area of Cook Inlet at the same time. Whenever such work is proposed, NMFS should condition any MMPA small take authorizations in consideration of synergistic or additive effects to listed species. Seismic operations should be prohibited from operating offshore of one another (i.e., to the north or south). This measure does not include high-resolution seismic operations, or seismic work nearshore or in shallow waters which have less potential to harass or harm listed species.

9.0 REINITIATION OF CONSULTATION

This concludes formal consultation on this action. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Biological Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Biological Opinion; or (4) a new species is listed or critical habitat designated that may be affected by this action. In circumstances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

10.0 LITERATURE CITED

Angliss, Robin P., D.P. DeMaster and A.L. Lopez. 2001. Alaska marine mammal stock assessments, 2001. USDOC, NMFS, Alaska Fisheries Science Center. NOAA Tech. Mem. NMFS-AFSC-124. December 2001.

Angliss, Robin P. and A.L. Lodge, 2002. Draft marine mammal stock assessments, 2002. Seattle, WA. USDOC, NOAA, NMFS and AFSC, 203p.

Bowles, A.E., M. Smultea, B. Wursig, D.P. DeMaster, D.Palka.1994. Abundance of marine mammals exposed to transmissions from the Heard Island Feasibility Test. J. Acoust. Soc. Am. 96(4):2469-2482

Brajas, M., D. Howard, and K. Monkelein. 1999. Telephone conversation in November between Martha, Brajas, USDOI, MMS, Pacific OCS Region; Don Howard, USDOI, MMS, Gulf of Mexico Region; and Kyle Monkelein, USDOI, MMS, Alaska OCS Region; subject: the number of exploration wells drilled on the Pacific, Atlantic and Gulf of Mexico OCS. Conversation between Kyle Monkelein and Caryn Smith, USDOI, MMS, Alaska OCS Region; subject: the number of exploration wells drilled on the Alaska OCS.

Braithwaite, Lee F., Michael G. Aley, and David L. Slater. 1983. The effects of oil on the feeding mechanism of the bowhead whale. Final report. Contract No. AA 851-CTO-55. Prepared for the U.S. Department of the Interior by Brigham Young University, Utah. Salt Lake City: BYU, 1983.

Bratton, Gerald R., Charles B. Spainhour, Wayne Flory, Mark Reed, and Katherine Jayko. 1993. "Presence and potential effects of contaminants." *In*: The Bowhead Whale. Eds. J.J. Burns, J.J. Montague, C.J. Cowles. The Society for Marine Mammalogy. Special Publication Number 2. Lawrence: Allen Press, Inc., 1993. 764.

Calkins, D.G. and K.W. Pitcher. 1982. Population assessment, ecology, and trophic relationships of Steller sea lions in the Gulf of Alaska. U.S. Dep. Comm., NOAA, OCSEAP Final Report 19 (1983).

Calkins, D.G. 1983. Marine mammals of lower Cook Inlet and the potential for impact from outer continental shelf oil and gas exploration, development, and transport. NOAA/OCSEAP, Envir. Assess. Alaskan Cont. Shelf. Final Rep. Prin. Invest. 20:171-263. NTIS PB85-201226.

Dahlheim, M.E. and T.R. Loughlin. 1990. Effects of the *Exxon Valdez* Oil Spill on the Distribution and Abundance of Humpback Whales in Prince William Sound, Southeast Alaska, and the Kodiak Archipelago. *In*: *Exxon Valdez* Oil Spill Natural Resource Damage Assessment. NRDA Marine Mammal Study No. 1, Unpublished Report. Seattle WA: USDOC, NOAA.

Dahlheim, M. E., and C. O. Matkin. 1994. "Assessment of Injuries to Prince William Sound Killer Whales." *In*: Marine Mammals and the *Exxon Valdez*. 1st ed. Ed. Thomas R. Loughlin. San Diego: API, 1994. 163-73.

Engelhardt, F. R. 1987. "Assessment of the Vulnerability of Marine Mammals to Oil Pollution." Fate and Effects of Oil in Marine Ecosystems. Proceedings of the Conference on Oil Pollution Organized Under the Auspices of the International Association on Water Pollution Research and Control (IAWPRC) by the Netherlands Organization for Applied Scientific Research. TNO Amsterdam, 23-27 Feb. 1987, The Netherlands. Eds. J. Kuiper, and W. J. Van Den Brink. Boston: Martinus Nijhoff Publishers, 1987.

Finley, K.J. 1982. The estuarine habit of the beluga or white whale *Delphinapterus leucas*. Cetus 4(2):4-5.

Frankel, A. S. and C. W. Clark. 1998. Results of low-frequency playback of M-sequence noise to humpback whales, *Megaptera novaeangliae*, in Hawaii. Can. J. Zool. 76:521-535.

Frankel, A. S., and C. W. Clark. 1999. Factors affecting distribution and abundance of humpback whales off the North Shore of Kauai. In prep.

Frankel, A. S., and C.W. Clark. 2000. Behavioral responses of humpback whales (*Megaptera novaeangliae*) to full-scale ATOC signals. J. Acoust. Soc. Am. 108(4).

Geraci, J.R. 1990. Physiologic and toxic effects on cetaceans. pp. 167-192. *In:* Sea mammals and oil: confronting the risks J.R. Geraci and D.J. St. Aubin, Editors. First ed., Academic Press, Inc. San Diego, California: 239 p.

Geraci, J. R., and D. J. St. Aubin. 1985. *Expanded Study of the Effects of Oil on Cetaceans, Final Report, Part I.* Contract 14-12-0001-29169.Prepared for U.S. Department of the Interior, Bureau of Land Management, Washington, D.C. by the University of Guelph, Ontario. N.p.: n.p., 1985.

Harvey, James T., and Marilyn E. Dahlheim. 1994. "Cetaceans in Oil." Marine Mammals and the Exxon Valdez. 1st ed. Ed. Thomas R. Loughlin. San Diego: API, 1994. 257-64.

Johnson, S.R., C.I. Malme, and R.A. Davis. 1989. Synthesis of information on the effects of noise and disturbance on major haulout concentrations of Bering Sea pinnipeds. OCS study, MMS-88-0092. Anchorage, AK.: USDOI,MMS,AK OCS Region, 267 p.

Ketten, D.R. 1994. Functional analyses of whale ears: adaptations for underwater hearing. IEEE Proc Underwat Acoustics 1: 264-270.

Lambertsen, R. H., Raymond J. Hintz, Winston C. Lancaster, Amy Hirons, Kerry Jo Kreiton, and Cindy Moor. 1989. Characterization of the Functional Morphology of the Mouth of the

Bowhead Whale, Balaena mysticetus, With Special Emphasis on Feeding and Filtration Mechanisms. NSB Contract 87-113. Prepared for the Department of Wildlife Management, North Slope Borough, Barrow, Alaska. Barrow: NSB, 1989.

LGL Ltd. 1998. Marine Mammal and acoustical monitoring of BP exploration (Alaska) open-water seismic program in the Alaskan Beaufort Sea, 1997. Unpublished LGL report, TA2150-3, page 5-89. Available NMFS Office of Protected Resources, Silver Spring MD.

Lipscomb, Thomas P., Richard K. Harris, Alan H. Rebar, Brenda E. Ballachey, and Romona J. Haebler. 1994. "Pathology of Sea Otters." Marine Mammals and the *Exxon Valdez*. 1st ed. Ed. Thomas R. Loughlin San Diego: API, 1994. 265-80.

Loughlin, T.R. , (Ed.). 1994. *Marine Mammals and the Exxon Valdez*. San Diego CA: Academic Press.

Malme, C.I., P.R. Miles, P. Tyack, C.W. Clark, and J.E. Bird. 1985. Investigation of the potential effects of underwater noise from petroleum industry activities on feeding humpback whale behavior. Report No. 5851, prepared by Bolt, Beranek and Newman Inc., Inc., Cambridge, USA, for U. S. Minerals Management Service, Alaska OCS Office, Anchorage, USA.

Malme, C.I., Miles PR, Clark CW, Tyack P, Bird JE (1983) Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior: final report for the period of 7 June 1982- 31 July 1983. Report No. 5366, prepared by Bolt, Beranek and Newman Inc., Cambridge, USA, for U. S. Minerals Management Service, Alaska OCS Office, Anchorage, USA.

Malme, C. I., P. R. Miles, C. W. Clark, P. Tyack, and J. E. Bird. 1984. Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior/Phase II: January 1984 migration. BBN Rep. 586. Rep. from Bolt, Beranek, & Newman, Inc. Cambridge, MA, for U.S. Minerals Management Serv., Anchorage, AK. Var. pag. NTIS PB 86-218377.

Mobley, J. R., L. M. Herman, A. S. Frankel. 1988. Responses of wintering Humpback whales (Megaptera novaeangliae) to playback of recordings of winter and summer vocalizations and of synthetic sounds. Behav. Ecol. Sociobiol. 23:211-223

Moore, Sue E. and Janet T. Clarke. 2002. Potential impact of offshore human activities on gray whales (Eschrichtius robustus). J. Cetacean Res. Manage. 4(1):19-25, 2002.

Minerals Management Service. 2002. Draft environmental impact statement for the Cook Inlet planning area, oil and gas lease sales 191 and 199. USDOI, MMS, Alaska OCS Region.

Mizroch, Sally A., D.W. Rice, D.Z. Zwiefelhofer, J. Waite, and W.L. Perryman. 2001. Distribution and movements of fin whales in the North Pacific Ocean. Unpub. Rep. NOAA, Nat. Mar.

Mam. Lab., May, 2001, 35p.

Myrberg, A.A., Jr. 1978. Ocean noise and behavior of marine animals: Relationships and implications. p. 169-208 *In*: J.L. Fletcher and R.G. Busnel (eds.) Effects of Noise on Wildlife. Academic Press, New York. 305p.

NMFS. 1995. Recovery plan for Steller sea lion *(Eumetopias jubatus*). Prepared by the Steller sealion recovery team for the National Marine Fisheries Service, Silver Spring, MD, 92p.

NMFS. 2001 a. Biological opinion and incidental take statement for authorization of Bering Sea/Aleutian Islands groundfish fisheries based on the Fishery Management Plan for the Bering Sea/Aleutian Islands Groundfish as modified by amendments 61 and 70; and authorization of Gulf of Alaska groundfish fisheries based on the Fishery Management Plan for Groundfish of the Gulf of Alaska as modified by amendments 61 and 70, and parallel fisheries for pollock, Pacific cod, and Atka mackerel, as authorized by the State of Alaska within 3 nm of shore. Nat. Mar. Fish. Ser., Juneau, Ak., October, 2001.

NMFS. 2001 b. Biological opinion and incidental take statement for the North Pacific Acoustic Laboratory off Kauai, Hawaii, issuance of regulations for a small Take Authorization under the Marine Mammal Protection Act, and for Incidental Take associated with the continued use of the Acoustic Thermoometry of Ocean Climate Sound Source for the North Pacific Acoustic Laboratory off Kauai, Hawaii Nat. Mar. Fish. Ser., Southwest Region, April, 2001.

NMFS. 2001 c. Biological opinion for oil and gas leasing and exploration activities in the Beaufort Sea, Alaska; and authorization of small takes under the Marine Mammal Protection Act. Nat. Mar. Fish. Ser., Juneau, Ak., October, 2001.

NMFS. 2002. Biological opinion for proposed Marine Mammal Permits which would authorize various research activities on Steller sea lions. Nat. Mar. Fish. Ser., Juneau, Ak., November 2002.

Payne, R. and D. Webb. 1971. Orientation by means of long range acoustic signaling in baleen whales. Ann. N.Y. Acad. Sci. 188:0110-141.

Research Planning Institute, 1986. The southern coast of the Alaska Peninsula: geomorphology and sensitivity to spilled oil. Final report for National Oceanic and Atmospheric Administration, National Ocean Service, Alaska Office.

Richardson, W. J., J. Charles R. Greene, C. I. Malme, and D. H. Thomson. 1995. Marine Mammals and Noise. Academic Press, San Diego, CA.

Richardson, W. J., B. Wursig and C. R. Greene, Jr. 1990. Reactions of bowhead whales, *Balaena mysticetus*, to drilling and dredging noise in the Canadian Beaufort Sea. Mar. Envir. Res. 29(2):135-160.

Richardson, W.J., Ed. 1999. Marine mammal and acoustical monitoring of Western Geophysical's open-water seismic program in the Alaskan Beaufort Sea, 1998. LGL Rep. TA2230-3. Rep. From LGL Ltd., King City, Ont., and Greeneridge Sciences, Inc., CA, for Western Geophysical, Houston, TX, and Nat. Mar. Fish. Serv., Anchorage, AK, and Silver Spring, MD. 390p.

Sweeney, J.C. 1990. Marine Mammal behavior diagnostics. In: Dierauf, L.A. (ed.), CRC handbook of marine mammal medicine: health, disease, and rehabilitation. CRC Press, Inc., Boca Raton, FL.

Richardson, W. J., C. R. Greene Jr., M. A. Smultea, B. Wursig, J. S. Hanna, W. R. Koski, G. W. Miller, N. J. Patenaude, R. Blaylock, and R Elliott. 1995a. Acoustic Effects of Oil Production Activities on Bowhead and White Whales Visible During Spring Migration Near Pt. Barrow, Alaska--1991 and 1994 Phases: Sound Propagation and Whale Responses to Playbacks of Icebreaker Noise. OCS Study MMS 95-0051, LGL Report TA954, Contract 14-12-0001-30412.Prepared for U.S. Department of the Interior Minerals Management Service, Procurement Operations by LGL, Ltd. and Greeneridge Sciences Inc. N.p.: n.p.,

Richardson, W. John, B. Wursig, and C. R. Greene, Jr. 1990. "Reactions of Bowhead Whales, *Balaena mysticetus*, to Drilling and Dredging Noise in the Canadian Beaufort Sea." Mar. Environ. Res. 29 (1990): 135-160.

Richardson, W. John, C. R. Greene, Jr., C. I. Malme, D. H. Thomson, S. E. Moore, and B. Würsig. 1995. Marine Mammals and Noise. San Diego: API, 1995b.

Spies, R.B., S. D. Rice, D. A. Wolfe, and B. A. Wright. 1996. "The Effects of the Exxon *Valdez* Oil Spill on the Alaskan Coastal Environment." Proceedings of the Exxon *Valdez* Oil Spill Symposium. 2-5 February, 1993, Anchorage. American Fisheries Society Symposium 18. Bethseda: American Fisheries Society.

Thorsteinson, F.V., and C.J. Lensink. 1962. Biological observations of Steller sea lions taken during an experimental harvest. Jour. Wildlife Management, 26:353-359.

Todd S, Stevick P, Lien J, Marques F, Ketten D. (1996) Behavioral effects of exposure to underwater explosions in humpback whales *Megaptera novaeangliae*. Can J Zool 74: 1661-1672.

USDOI, MMS, Alaska OCS Region. 1997. Alaska Environmental Studies Strategic Plan FY 1998-1999. Anchorage, AK: USDOI, MMS, Alaska OCS Region, Environmental Studies Program.

USDOI, MMS, Alaska OCS Region. 1997 Arctic Seismic Synthesis and Mitigating Measures Workshop, Barrow, Ak. OCS Study, MMS 97-0014. Whalers' signed statement. Anchorage, AK: USDOI, MMS, Alaska OCS Region, 170 pp.