


MEMORANDUM

TO: Council and SSC Members

FROM: Clarence G. Pautzke
Executive Director 

DATE: April 10, 1995

SUBJECT: Oil/Gas Lease Sales - MMS Sale 149

ESTIMATED TIME ½ hour

ACTIONS REQUIRED:

Review Cook Inlet/MMS Sale 149

BACKGROUND

The proposed action by Minerals Management Service would offer 402 blocks (approximately 1.98 million acres) of the Cook Inlet Planning Area for leasing [Item C-1(a)]. These blocks are located in waters from 5 to 40 km (about 3-25 mi) offshore and generally from greater than 10 m to 200 m (about 30-650 ft) deep. MMS estimates that if commercially recoverable oil resources are discovered and produced as a result of Sale 149, this amount would most likely range from 100 to 300 million barrels; a high-case analysis estimates between 550 and 1,100 million barrels.

The Council may wish to recommend to the Minerals Management Service a management alternative to the proposed Cook Inlet Sale 149. The comment period closes on April 19, the day of Council consideration.

Item C-1(b) lists the alternatives for Sale 149, including four alternatives which delete certain blocks from the sale to accommodate a "Wildlife Concentration Deferral," "Coastal Fisheries Deferral," "Pollock- Spawning Area Deferral," and "General Fisheries Deferral." A map of these exclusions is included in Item C-1(a).

Item C-1(c) lists the effects under the lease alternatives on the following issues identified as significant through the scoping process.

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| water quality | endangered and threatened species |
| air quality | local economy |
| lower trophic-level organisms | commercial fishing |
| fisheries resources | subsistence-harvest patterns |
| marine and coastal birds | sociocultural systems |
| non-endangered marine mammals | National Parks and Wildlife refuges and |
| (pinnipeds, cetaceans, and sea otters) | recreational areas |

Of particular concern is disturbance at major wildlife concentrations areas, including bird colonies, marine mammal haulouts and breeding areas, and wildlife parks and refuges. Environmentally sensitive areas included in Sale 149 are Chisik and Duck Islands, Kamishak Bay, Kachemak Bay, the Barren Islands, Marmot Island, Tugidak Island, Chirikof Island, Puale Bay, and the Pye Islands. Also, five National Wildlife Refuges (Alaska Maritime, Alaska Peninsula, Becharof, Kenai, Kodiak); Lake Clark National Park and Preserve;

Aniakchak National Monument and Preserve; all islands classified as wilderness in Katmai National Park and Preserve; McNeil River Sanctuary; and Kalgin Island, Clam Gultch, Fox River Flats, Kachemak Bay critical habitat areas. The Yukon Island Main site, National Historic Landmark is also included.

The draft EIS indicated that populations in the above areas are at increased risk under this sale.

“...It is assumed that there is a 100-percent chance of small (<1,000 bbl) spills occurring during oil production. Although the probability is low, it is also assumed that a large ($\geq 1,000$ bbl) spill will occur and the amount of oil released by such a spill will be 50,000 bbl; the Oil-Spill Risk Analysis estimates a mean number of 0.31 spills $\geq 1,000$ bbl are likely to occur for Alternative I with an estimated 27-percent chance of one or more spills occurring. The chances of one or more large oil spills occurring for Alternatives IV, V, and VI are estimated to be 23, 19, and 21 percent, respectively. Alternative VII assumes only exploratory drilling activities would take place; if oil is discovered the quantity is estimated to be too small to be produced and there would be no large oil spills. For the cumulative case, the chance of two or more large oil spills occurring is estimated to be 64 percent.”

The Section 7 consultation prepared by the NMFS Alaska Region which indicates that exploration activities will have a negligible effect on endangered and threatened species (gray [soon to be de-listed], fin, humpback, sei, blue, right, and sperm whales; Steller sea lions; short-tailed albatrosses; Aleutian Canada geese; and peregrine falcons) is attached as Item C-1(d). The small population of beluga whales is also considered. Species whose populations are known or thought to be declining and are not protected under the ESA include Steller's eiders, spectacled eiders, marbled murrelets, Pacific harbor seals, and northern fur seals.

Proposed Sale 149 Cook Inlet Fact Sheet

Cook Inlet/Shelikof Strait Planning Area:

Number of Blocks -- 1,093
Area (Hectares) -- 2,167,429.66
(Acres) -- 5,355,827.06

Sale 149 Area of Call for Information and Nominations:

Number of Blocks -- 402
Area (Hectares) -- 800,127.93
(Acres) -- 1,977,156.13

Range of Planning Area Water Depths:

From 1 foot to approximately 1,300 feet

Range of Planning Area Distance from Shore:

3 miles to approximately 25 miles

Dollar Amount Expended on Studies:

\$ 2,500,000 Cook Inlet
\$ 4,500,000 Cook Inlet/Shelikof Strait

Leasing History (Cook Inlet/Shelikof Strait Planning Area):

- Sale CI, October 1977
- Sale 60, September 1981
- RS-2, August 1982
- Sale 88, Gulf of Alaska/Cook Inlet, was originally scheduled for December 1984, but after a long postponement, was canceled May 2, 1986, due to lack of industry interest.
- Sale 114, Gulf of Alaska/Cook Inlet, was originally scheduled for August 1990, but the presale process was delayed by the Secretary of the Interior pending further information about the consequences of the *Exxon Valdez* oil spill.

Leases Issued (Cook Inlet/Shelikof Strait Planning Area):

Total number of leases issued -- 100
Status of leases -- All leases have been relinquished or have expired.

Wells Drilled (Cook Inlet/Shelikof Strait Planning Area) :

1 Deep Stratigraphic Test well and 13 exploratory wells. All wells have been plugged and abandoned.

Critical Action Dates for Sale 149 Cook Inlet:

Regional Information Base Review	06/26/91
Request for Interest and Comments	Due 10/15/91
Comments on Call for Information	Due 03/23/92
Specific Scoping Meetings (Scoping is an ongoing process)	Completed 03/27/92
Area Identification	Announced 08/17/92
Deletion of Shelikof Strait from the Leasing Proposal	Announced 1/27/94
Draft EIS -- Notice of Availability to the Public	January 19, 1995
Public Hearings Completed	March 8, 1995
Comments on Draft EIS	April 19, 1995
Final EIS Filed with EPA	Early 1996
Sale 149 Lease Sale	Mid 1996

The Sale 149 Cook Inlet Leasing Proposal -- Alternative I:

The leasing proposal (Alternative I) consists of 800,127.93 hectares (1,977,156.13 acres) of OCS lands. The 402 blocks in the proposed Sale 149 area encompass a portion of the Cook Inlet/Shelikof Strait Planning Area and are located in waters that are from about 5 to 40 kilometers (3 to 25 miles) offshore in water depths that range from less than one meter to greater than 470 meters (1 to 1,300 feet). No more than 250 blocks will be leased.

Alternatives to the Proposal:

- II No Lease Sale: The no-sale alternative would remove the entire area for Alternative I from leasing.
- III Delay the Sale: This alternative would delay the sale for up to a 2-year period.
- IV Wildlife Concentration Deferral Alternative: This alternative would modify the proposed action by deferring leasing on 52 blocks (98,319.49 hectares or 242,952.38 acres) in areas located near Chisik and Duck Islands (Tuxedni Bay), and the Barren Islands.
- V Coastal Fisheries Deferral Alternative: This alternative would modify the proposed action by deferring leasing on 154 blocks (261,171.79 hectares or 645,368.54 acres) in areas around the perimeter of much of the Call area in lower Cook Inlet.
- VI Pollock-Spawning Area Deferral Alternative: This alternative would modify the proposed action by deferring leasing on 42 blocks (77,449.70 hectares or 191,382.09 acres) in an area in the southern part of the Sale area.
- VII General Fisheries Deferral Alternative: This alternative would modify the proposed action by deferring leasing on 216 blocks (371,583.93 hectares or 918,202.48 acres) in areas around the perimeter of much of the Call area in lower Cook Inlet and northern Shelikof Strait.

Mitigating Measures:

Stipulations (All Stipulations are Considered Part of the Proposed Action and Alternatives)

- Protection of Archaeological Resources
- Protection of Biological Resources
- Orientation Program
- Transportation of Hydrocarbons

Information to Lessees (Part of the Proposed Action and Alternatives)

- Bird and Marine Mammal Protection
- Steller Sea Lion
- Coastal Zone Management
- Oil-Spill-Response Preparedness
- Sensitive Areas to be Considered in the Oil-Spill-Contingency Plans
- Minimizing Potential Conflicts Between Oil and Gas and Fishing Activities

Information to Lessees (Potential Mitigating Measures)

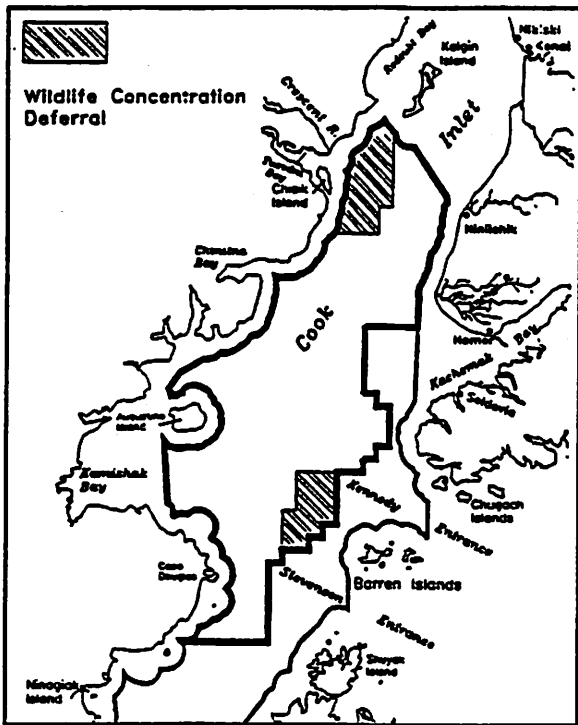
- Discharges into the Marine Environment
- Community Monitoring of the Marine Environment

Exploration Period (Sale 149 Cook Inlet):

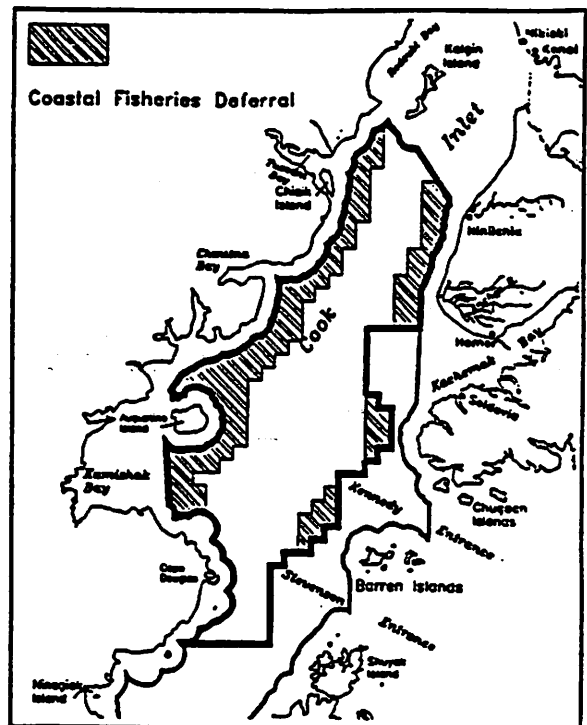
- Estimated 1 to 2 Exploration Drilling Units
- Marine Support: Kenai, Homer
- Air Support: Kenai, Homer

Development and Production Period (Sale 149 Cook Inlet) :

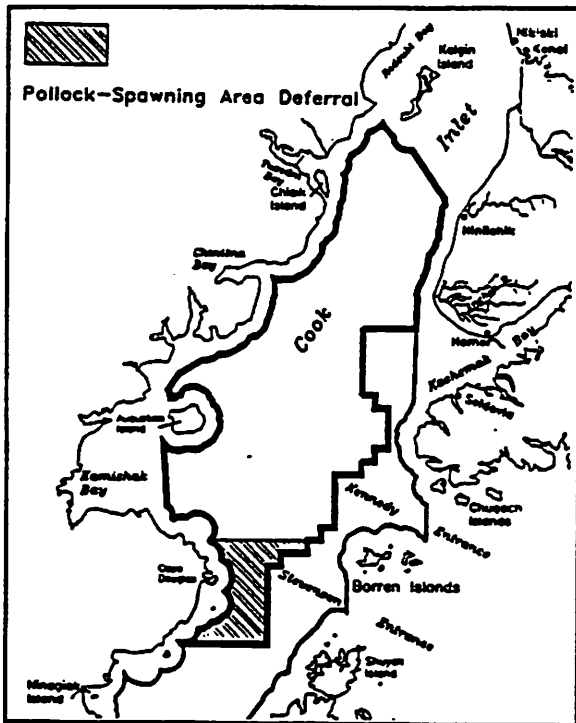
- Estimated 2 to 5 Platforms: steel-jacketed, ice-resistant
- Marine Support: Homer, Kenai
- Air Support: Kenai, Homer
- On-shore Facilities: An oil terminal and/or gas processing facility most probably located at Nikiski.
- Produced Hydrocarbons: Trunk line to shore (Anchor Point) then overland to Nikiski.



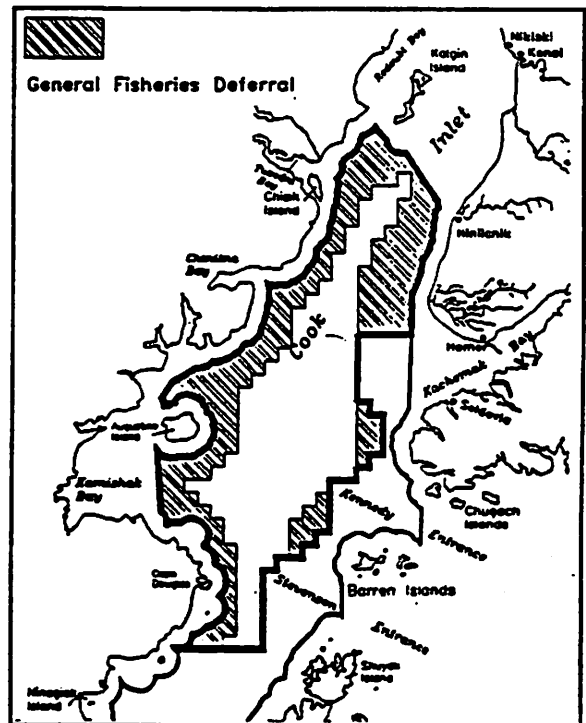
Alternative IV. Wildlife Concentration Deferral Alternative



Alternative V. Coastal Fisheries Deferral Alternative



Alternative VI. Pollock-Spawning Area Deferral Alternative



Alternative VII. General Fisheries Deferral Alternative

II. Alternatives Including the Proposed Action:

A. Alternative I, The Proposal: Alternative I would offer 402 whole and partial blocks (about 0.8 million hectares [ha] or 1.98 million acres) of the Cook Inlet Planning Area for leasing; this area is located in lower Cook Inlet and the northern part of Shelikof Strait (Fig. II.A.1). For Alternative I, three hypothetical scenarios have been developed to assess the potential environmental effects of the sale; these effects are analyzed in Sections IV.B through IV.F. The scenarios are based on an estimated range of oil resources for a low case, base case, and high case. These ranges consider available geologic as well as economic information. The ranges reflect the uncertainty associated with estimating potential resources prior to exploratory drilling and are believed to be more realistic indicators of resources that actually may be present than estimates based on single numbers. Although in this section the predicted resources for the low, base, and high cases are presented in a range, in Section IV these resources are presented as a single number for analytical purposes. It is in Section IV that the environmental analyses are presented.

1. Low Case: The low case of the proposed action features an exploration-only scenario. It is assumed no commercially producible resources would be discovered. Exploratory drilling activities are expected to occur in 1997 and 1998 (Appendix A). During this period, three exploration wells would be drilled; only one well would be drilled at a time. The types of drilling units most likely to be used would be heavy-duty semisubmersibles or jackups. The most likely support base for exploration-drilling activities would be in the Kenai/Nikiski area, but alternative bases may be located elsewhere on the Kenai Peninsula.

2. Base Case:

a. Resource Estimated Range and Basic Exploration, Development, and Production Assumptions for Effects Assessment: For Alternative I, the range of resources varies from a base-case low of 100 million barrels (MMbbl) produced over the 19-year life of the field to 300 MMbbl produced during the same period (Appendix A and Table II.A.1). The resource range is based on a range of assumed values of produced crude oil. The value per barrel of oil assigned ranged from \$16 to \$22. The \$6-difference in the price per barrel of oil is equivalent to a nearly threefold expansion in production and a two- to threefold expansion in related infrastructure. The oil-field-development scenario for the proposed action is based on the value of a barrel of oil. Table II.A.1 displays the infrastructure and developmental timeframes proposed for base case.

Exploratory drilling activities are expected to occur in 1997 and 1998 (Table II.A.1). During this period, one to five exploration wells and three to eight delineation wells are estimated would be drilled; only one well would be drilled at a time. The types of drilling units most likely to be used would be heavy-duty semisubmersibles or jackups. The most likely support base for exploration-drilling activities would be Kenai, but alternative bases may be located elsewhere on the Kenai Peninsula.

Activities associated with development and production would begin in 1999 with the installation of a production platform (Table II.A.1); two to five platforms would be installed during a 2- to 3-year period between 1999 and 2001. The timing and level of production activities are based on an estimated crude-oil-production range of 100 to 300 MMbbl. The estimated level of activities associated with crude-oil production is based on this range; the low end of the activity range is associated with the 100-MMbbl estimate and the high end with 300 MMbbl. As noted above, the 100-MMbbl estimate is based on a barrel of crude oil selling for \$16 and the 300-MMbbl estimate on oil selling for \$22. Between 2000 and 2002, an estimated 24 to 84 production and service wells would be drilled using 1 to 4 drilling rigs. Crude-oil production is estimated to begin in 2002 or 2003 and continue through 2020 or 2021; the production life of the Sale 149 field(s) is expected to be 19 years. Peak production is estimated to occur between 2003 and 2008; peak production would range from 8 to 25 MMbbl per year. Steel production platforms similar to those used in upper Cook Inlet may be the most likely type of platform used to develop and produce Sale 149 oil (Appendix A). Depending in part on site and environmental conditions, the size and shape of the field, and the oil reserves, other types of platforms that might be used in Sale 149 activities include concrete gravity-based platforms similar to those installed in the North Sea or a semisubmersible floating production system with subsea wells.

(3) The EIS Must Take a Global Perspective in its Analysis:

Testimony was presented in Homer and Anchorage that the EIS must take a global perspective on the environmental crimes, global warming, human-rights abuses, deforestation policies, and other actions of multinational oil-industry corporations that are being committed worldwide. This issue is not considered significant for this EIS, because this is a programmatic issue that was addressed in the OCS Natural Gas and Oil Resource Management Comprehensive Program (CP), 1992-1997, EIS. It already has been addressed in the "No Action" alternative and "Global Climate Change" sections of the CP EIS, which will be summarized in this EIS and incorporated by reference.

(4) Effects on Land Use: The land use section of the EIS has been

scoped out based on the fact that the issue of land use has generated little public interest apart from concerns regarding the potential siting of petroleum-related facilities and potential effects on national parks and wildlife refuges located within the area of Call. Facility-siting issues will be covered in the discussion of the scenario and will not be issues for effects analysis. Rather than being titled as a land use issue, potential effects on national parks and wildlife refuges will be covered in the section on national parks and refuges and recreational areas.

2. Alternatives:

a. Alternatives Suggested During the Scoping Process: Several alternatives, such as delaying or cancelling the sale, other than offering the entire area for leasing (Alternative I, the Proposal), were suggested during the scoping process for Sale 149. The following additional alternatives were developed by MMS in response to suggestions.

(1) Alternative IV, Wildlife Concentration Deferral Alternative: This alternative would offer for leasing all the area described for Alternative I except for areas located near Chisik and Duck Islands (Tuxedni Bay) and the Barren Islands (Fig. II.D.1). The areas removed by the deferral alternative consist of 52 whole and partial blocks (about 98,000 hectares [ha] or 241,000 acres), about 12 percent of the Alternative I area. Chisik and Duck Islands are part of the Alaska Maritime National Wildlife Refuge and constitute the largest seabird colony in Cook Inlet; the FWS recommended deleting the Chisik/Duck Island area from the proposed sale area. The FWS also recommended establishing a buffer zone around the Barren Islands.

Sugarloaf Island in the Barren Islands group is the site of the second largest Steller sea lion rookery in Alaska (2,000+ pups in 1989). This species is classified as threatened under the ESA. Although adults are insulated by a layer of fat and are protected from oil-induced hypothermia, young pups have less insulation. Also, pups are likely to be more sensitive to the effects of oil on their eyes, nose, and mouth membranes. Oil contact could cause inflammation of these areas as well as problems with nursing, vision, and recognition between female-pup pairs. Local populations of Pacific harbor seals, currently a declining species in Alaska, and sea otters could be adversely affected by spilled oil contacting the Barren Islands. Also, the Barren Islands lie within the migration route for the gray whale and zone of probable occurrence of this and several other species of whales.

Deferral of blocks near the above areas could provide some geographic (spatial) protection for intensively used nearshore marine bird-foraging, -staging, -migration, and -overwintering areas. In addition, most seabirds forage in the vicinity of their colonies during the breeding season; these birds (particularly the alcidae, including murre and puffins) spend a great deal of time at the water's surface and so are extremely vulnerable to oil spills. Seabirds rely on the fish and invertebrates found in the waters surrounding their colonies for food, especially during the critical chick-rearing period. The full range of effects are addressed in this EIS.

Deletion of the blocks adjacent to Chisik and Duck Islands and the Barren Islands would address concerns expressed regarding (1) potential effects of habitat disturbance and alteration on marine mammals and birds, (2) potential effects of oil spills on marine mammals and seabirds and their habitats in these areas, and (3) risks to areas of subsistence use.

(2) Alternative V, Coastal Fisheries Deferral Alternative: This alternative would offer for leasing only those blocks in the central part of the planning area in lower Cook Inlet and the northern Shelikof Strait (Fig. II.E.1). The coastal part of the Sale 149 area deleted by this alternative consists of 154 blocks (about 262,000 ha, or 647,000 acres), about 33 percent of the Alternative I area. The perimeter subarea varies from one to six blocks wide (approximately 3-18 miles [mi]). The blocks proposed for deletion from the sale area by this deferral alternative include many of the blocks proposed for deletion by Alternative IV, Wildlife Concentration Deferral Alternative. The reasons for deleting the blocks from the sale area as proposed by Alternative VI are the same as those reasons stated for Alternative IV.

The Kenai Peninsula Fishermen's Association (KPFA) proposed deleting blocks (1) around the perimeter of the sale area in lower Cook Inlet and the northern part of Shelikof Strait and all of the blocks in the southern part of the strait. The KPFA noted that (1) the proposed sale area north of Anchor Point lies within the heart of the Cook Inlet salmon gillnet fishery, and (2) parts of the sale area between Kalgin Island and Cape Douglas have been identified by the ADF&G as being important to critical fish and wildlife resources. The KPFA also expressed opposition to leasing in these areas because of (1) potential conflicts between commercial-fishing activities and oil-industry operations, (2) the high risk that an oil spill poses to the biological resources, and (3) as demonstrated by a recent spill (Kenai Pipe Line Co. oil spill of January 4, 1992, in Nikiski), the lack of technology to successfully contain and clean up a spill in Cook Inlet.

The deferral alternative as proposed by the KPFA is based, in part, on information contained in *Resource Report for Cook Inlet Sale No. 60* (ADF&G, 1988). The blocks (tracts) identified in Figure II.A.1 are the same as those that the ADF&G identified in the report as "hazardous" because of the (1) physical environment (tidal transport, wind transport, and circulation), (2) importance of the coastal fish and wildlife resources, and (3) vulnerability of these resources to oil from spills occurring within some parts of the area or outside but transported into the area. As noted in the report, this threat to the biological resources largely is based on the stated assumed inability of present cleanup technology and equipment to cope with the extreme environmental conditions occurring in the area.

Deleting blocks around the perimeter of the planning area in lower Cook Inlet and northern Shelikof Strait would address scoping concerns expressed regarding (a) potential effects of habitat disturbance and alteration and oil spills from platforms on the marine mammals, seabirds, and fishes and shellfish (including those species commercially exploited) and their habitats in these areas; (b) potential effects to areas of subsistence use; and (c) potential effects to areas important for their intrinsic wilderness values. It is not anticipated these deletions would afford much protection in the event of a tanker spill.

(3) Alternative VI, Pollock-Spawning Area Deferral Alternative: The Pollock-Spawning Area Deferral Alternative would offer for leasing the lower Cook Inlet part of the Sale 149 area (Fig. II.F.1); the Shelikof Strait part of the sale area, 42 blocks—about 10 percent of the Alternative I area (about 77,000 ha or 190,000 acres)—would be deleted. Shelikof Strait is a biologically important area supporting extensive commercial fisheries, numerous seabird colonies, and endangered and threatened and nonendangered marine mammals. The Steller sea lion is listed as a threatened species and is common to the waters of Shelikof Strait. The Pacific harbor seal population in the northern and western Gulf of Alaska has been declining over the last decade.

Deletion of the Shelikof Strait blocks from the Sale 149 area was proposed by the National Oceanic and Atmospheric Administration, FWS, Marine Mammal Commission, the Steller Sea Lion Recovery Team, State of Alaska, Kodiak Island Borough, Lake and Peninsula Borough (King Salmon, Alaska), various public interest organizations and individuals, and the State of Oregon.

Deleting the blocks in Shelikof Strait would address scoping concerns expressed regarding (1) potential effects of habitat disturbance and alteration and oil spills on the marine mammals (including the threatened and endangered species), seabirds, fishes and shellfishes (including those species commercially exploited, especially pollock), and their habitats in this area; (2) potential effects to subsistence-use areas and resources; (3) disturbance to fish and wildlife; and (4) potential effects to areas important for their intrinsic wilderness values.

(4) Alternative VII, General Fisheries Deferral Alternative: This alternative would offer for leasing only those blocks in the central part of the planning area in lower Cook Inlet and the northern Shelikof Strait (Fig. II.G.1). The coastal part of the Sale 149 area deleted by this alternative consists of 216 blocks (about 371,000 ha or 917,000 acres), about 46 percent of the Alternative I area. The perimeter subarea varies from one to six blocks wide (approximately 3-18 mi). The blocks proposed for deletion from the sale area by this deferral alternative include many of the blocks proposed for deletion by Alternatives IV, V, and VI. The reasons for deleting the blocks from the sale area as proposed by Alternative VII are the same as those reasons stated for Alternatives IV, V, and VI.

b. Alternatives Not Selected for Inclusion in the EIS:

(1) Delay the Sale for at Least 3 Years: This alternative, suggested during the scoping process, recommends delaying the sale until (1) information is released to the public from the studies conducted to evaluate the environmental effects of the *Exxon Valdez* oil spill and the recovery rates of the various biological populations and (2) current baseline environmental data, especially water-quality data for the planning area are available.

An alternative to delay Sale 149 for 2 years is recommended to be analyzed in the EIS. The MMS anticipates that the difference between the amount of information available after 3 years is not expected to be significantly different than the amount of information available after 2 years. It is anticipated that the information about the effects of the *Exxon Valdez* oil spill will be in the environmental effects analysis in this EIS and that MMS's current water-quality-study results will be available for the final if not the draft EIS.

(2) Buffer Zones Around Marmot Island and Latax Rocks to Protect the Steller Sea Lion: Buffer zones (10-20-mi radius) around Marmot Island, Latax Rocks, and Tombstone Rocks were suggested at the Kodiak Scoping Meeting to help protect the Steller sea lion. Establishing buffer zones around these area is not recommended as deferral alternatives because of their distance from the Sale 149 area. Marmot Island lies east of Afognak Island and about 50 mi from the Sale 149 area. Latax Rocks are located in Stevenson Entrance about 5 mi north of Shuyak Island and about 15 mi from the sale area. Tombstone Rocks are located about 1 mile off a Peninsula separating Halibut and Gurney Bays along the western side of Kodiak Island. The location of these areas outside of the proposed sale puts them beyond the scope of any deferral.

3. Mitigating Measures:

a. Mitigating Measures Suggested During the Scoping Process: The following suggestions for mitigating measures to protect certain resources were received and are discussed below. Section II.H contains (1) mitigating measures that are part of the proposed action and the alternatives and (2) potential mitigating measures that are proposed for analysis. It should be noted that a Secretarial decision on the potential mitigating measures will not be made until the Notice of Sale has been approved.

(1) Stipulations (All Stipulations are Considered Part of the Proposed Action and Alternatives):

- No. 1—Protection of Archaeological Resources
- No. 2—Protection of Biological Resources
- No. 3—Orientation Program
- No. 4—Transportation of Hydrocarbons

Protection of Archaeological Resources is intended to protect cultural resources from damage due to off-shore activities and would apply to all blocks. The measure meets the USDO's statutory requirement to protect cultural resources. Since 1973, the USDO has included a stipulation on the OCS mineral lease tract notifying potential lessees that, where applicable, archaeological resource surveys and reports will be required. In order to convert the requirements of the archaeological lease stipulation into regulations, a proposed rule was published by MMS on October 12, 1993 (58 FR 52731). The final rule amends the

WATER QUALITY		
Alternative I (Base Case):	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>Water quality would be reduced from good (unpolluted) to polluted by the presence of hydrocarbons from one or more large ($\geq 1,000$-bbl) accidental oil spills that have a relatively low chance (27%) of occurring. Hydrocarbon levels $> 15 \mu\text{g/l}$ (Alaska chronic criterion for protection of marine life) would be temporary (1-< 2 months) and affect an area of several thousand square kilometers.</p>	<p>Effects are expected to be the same as the Alternative I (base case), except there would be no direct exploration or production discharges in the deferred areas (about 12% of the Alternative I area) and there would be a 3- to 20-percent reduction in the discharges. The chance of one or more large spills occurring is 23 percent.</p>	<p>Effects are expected to be the same as the Alternative I (base case), except there would be no direct exploration or production discharges in the deferred areas (about 33% of the Alternative I area) and there would be a 30- to 40-percent reduction in the discharges. The chance of one or more large spills occurring is 19 percent.</p>
LOWER TROPIC-LEVEL ORGANISMS		
Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>In lower Cook Inlet, a large ($\geq 1,000$-bbl) oil spill would have sublethal to lethal effects on an estimated (1) 1 to 3 percent of the phytoplankton and zooplankton populations in the open-water areas, (2) 2 percent of the plankton in embayments, (3) 20 to 30 percent of the intertidal and shallow subtidal marine invertebrates, and (4) < 5 percent of the subtidal benthic populations; there is a 27-percent chance of one or more large spills occurring. Recovery times are expected to take 1 or 2 days for phytoplankton and up to 1 week for zooplankton in open-water areas, 1 to 2 weeks for plankton in embayments, and 2 to 3 years for marine invertebrates in high energy environments and 7 years in low energy environments.</p>	<p>Effects are expected to be similar to the Alternative I (base case).</p>	<p>Effects are expected to be similar to the Alternative I (base case).</p>
FISHERIES RESOURCES		
Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>Assuming contact (when combined probability of $> 5\%$ to contact specific land or resource segments), the overall estimated effects of an assumed large ($\geq 1,000$-bbl) spill on fisheries resources are expected to be minimal, with the possible loss of some adult demersal fishes and possible increased mortality of eggs and larvae of pink salmon and semidemersal and demersal fishes; there is a 27-percent chance that one or more spills $\geq 1,000$ bbl could occur. The various effects to fisheries resources taken altogether are not expected to cause population-level changes.</p>	<p>Effects are expected to be the same as the Alternative I (base case).</p>	<p>Effects are expected to be the same as the Alternative I (base case).</p>

WATER QUALITY		
Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative-Exploration Only)	Cumulative Case
Effects are expected to be the same as the Alternative I (base case), except there would be no direct exploration or production discharges in the deferred areas (about 10% of the Alternative I area) and there would be a 4- to 25-percent reduction in the discharges. The chances of one or more large spills occurring is 21 percent.	The overall quality of Cook Inlet water would remain good (unpolluted). There would be no direct exploration discharges in the deferred areas (about 46% of the Alternative I area) and a 90- to 100-percent reduction in the discharges compared to Alternative I (base case).	The permitted, routine discharges associated with municipal wastewaters, seafood processing, and oil and gas development and small (<1,000-bbl) oil spills are not expected to cause any measurable degradation of Cook Inlet water quality. Water quality would be reduced from good (unpolluted) to polluted by the presence of hydrocarbons from two or more large (≥1,000-bbl) oil spills that have a 64-percent chance of occurring; one spill is assumed from Sale 149 Alternative I (base case) production and the other from offshore State production. Contamination from each spill (the presence of hydrocarbons in amounts >15 µg/l) would be temporary (last for a month, or more) and affect an area of several thousand square kilometers.
LOWER TROPIC-LEVEL ORGANISMS		
Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative-Exploration Only)	Cumulative Case
Effects are expected to be similar to the Alternative I (base case).	Routine activities associated with Alternative VII are estimated to have mostly sublethal effects on about half of the lower trophic-level organisms estimated for the base case (<1% of those in the sale area). The recovery of benthic organisms from drilling discharges is expected within 1 year after they cease.	Each of the two large spills is estimated to have lethal and sublethal effects on (1) 1 to 5 percent of the plankton, (2) about 20 to 30 percent of the intertidal and shallow subtidal marine invertebrates, and (3) <5 percent of the subtidal benthic populations; there is a 64-percent chance of one or more large (≥1,000-bbl) spills occurring. One spill is assumed from Proposal production and the other from offshore State production—assuming each spill is 50,000 bbl and spill contact to land segments when combined probability ≥1percent. After each spill, recovery times are expected to take 1 or 2 days for phytoplankton, up to 2 weeks for zooplankton, and 2 to 3 years for marine invertebrates in high-energy environments.
FISHERIES RESOURCES		
Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative-Exploration Only)	Cumulative Case
Similar to Alternative I, changes in population levels are not expected. The reduced potential of an oil spill decreases the potential effects (lethal) to the eggs and larvae of pollock in Shelikof Strait and of other demersal fishes in the sale area. Fisheries resources around the Barren Islands, Shuyak Island, and Cape Douglas also are afforded some additional protection.	Effects on finfish populations are expected to be minimal. Effects on demersal fishes very likely would be limited to only the short time periods when materials are being discharged.	The overall cumulative effect on fisheries resources are likely to include reduced stocks of some fisheries resources (sockeye, coho, and chinook salmon and some semidemersal fishes such as pollock) primarily due to the potential for overharvest of these stocks by commercial fishing activities. This effect could persist for several generations or longer. The contribution of the proposal to the cumulative case is expected to be minimal with no population-level effects.

MARINE AND COASTAL BIRDS

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>Effects of a 50,000-bbl-oil spill assuming most likely contact (when $\geq 5\%$) to bird habitats are expected to include the loss of several thousand birds with recovery taking more than one generation (probably < 3 generations or < 15 years); the chance of one or more large ($\geq 1,000$-bbl) oil spills occurring is estimated to be 27 percent. Sea ducks and shorebirds are expected to suffer reduced productivity in areas where intertidal-habitat contamination from the spill persists for a number of years, with this local effect expected to last for > 1 year to perhaps several years.</p>	<p>Effects are expected to be the same as the Alternative I (base case). This alternative could provide localized reduction in potential platform oil-spill effects to seabirds nesting in Tuxedni Bay (Cassock/Duck Islands) and, to a lesser extent, the Barren Islands and other marine and coastal bird habitats areas.</p>	<p>Effects are expected to be the same as the Alternative I (base case). Oil-spill effects on bird populations could be potentially reduced locally in the Kamishak, Tuxedni, Chinitna, and Kachemak Bays.</p>

NONENDANGERED MARINE MAMMALS (PINNIPEDS, CETACEANS, AND THE SEA OTTER)

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>A large (50,000-bbl) spill, assuming contact with marine mammals, would have measurable (numbers of individuals) lethal effects on fur seals (< 10), harbor seals (63), killer whales (< 5), beluga whales (< 10), and sea otters (75-100); the chance of one or more large ($\geq 1,000$ bbl) oil spills occurring is estimated to be 27 percent. Fur and harbor seal mortalities are not expected to have population level effects. Recovery to pre-spill numbers for killer whales is expected to take ≥ 1 years, beluga whales 2 years, and sea otters 1-2 years. Noise, disturbance, and habitat alteration activities would be relatively short term and very localized and should not affect marine mammal survival.</p>	<p>Effects from oil spill contact are the same as the base case with a potential mortality of < 10 fur seals, killer whales, and beluga whales, respectively; approximately 60 harbor seals; and between 75 to 100 sea otters. Recovery to prespill numbers is estimated to occur in about 1 to 2 years. Potential habitat alteration and noise and disturbance effects to these marine mammals due to exploration and production in these buffer areas also would be eliminated.</p>	<p>Effects from oil spill contact are the same as the base case with a potential mortality of < 10 fur seals, killer whales, and beluga whales, respectively; approximately 60 harbor seals; and between 75 to 100 sea otters. Recovery to prespill numbers is estimated to occur in about 1 to 2 years. Potential noise and disturbance effects to these marine mammals due to exploration and production in these areas also would be eliminated.</p>

ENDANGERED AND THREATENED SPECIES

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>Effects of disturbance and drilling discharges on endangered whales and the Steller sea lion are expected to be minimal. A large ($\geq 1,000$-bbl) oil spill (assuming most likely spill contact to habitats with combined probability $\geq 5\%$) is not expected to cause whale mortality, but the regional sea lion population is expected to require at least one generation for recovery from contact. No adverse effects are expected on short-tailed albatross, Aleutian Canada goose, or peregrine falcon populations. Wintering Steller's eiders are expected to require up to two generations for recovery from oil spill contact. Effect of a large oil spill on endangered species is expected to be minimal with a few species requiring up to 2 generations for recovery from contact; marbled murrelets may require up to 8 generations.</p>	<p>Overall effects are expected to be essentially as determined for the Alternative I (base case)—effects on whales nonlethal, Steller sea lion losses requiring at least 1 generation for recovery, Steller's eider losses requiring 2 generations for recovery. This alternative could provide limited local reduction of oil spill effects in the Barren Islands.</p>	<p>Overall effects are expected to be slightly less than determined for the Alternative I (base case)—effects on whales nonlethal, Steller sea lion losses requiring at least 1 generation for recovery, Steller's eider losses requiring 2 generations for recovery. This alternative could provide limited local reduction of oil spill effects in southeastern lower Cook Inlet and the Barren Islands</p>

MARINE AND COASTAL BIRDS

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
<p>Effects are expected to be about the same as the Alternative I (base case). Oil-spill effects on bird populations could be reduced locally in the Cape Douglas area, nearshore habitats on the western side of Afognak and Shuyak Islands, and in Kamishak and Kachemak Bays to a limited extent due to less oil being transported in the lease area.</p>	<p>This alternative is expected to greatly reduce the effects of the Alternative I (base case). Overall effects are expected to include the loss of very small numbers of birds or their eggs (such as fewer than 100 individuals), with recovery occurring within less than one generation, and no population effects on marine and coastal birds are expected to occur.</p>	<p>Overall effects on marine and coastal birds are expected to involve the loss of tens of thousands of birds and the loss of thousands of acres of old-growth-forest habitat of some species (murrelets). This effect is expected to persist for more than one to several generations. The contribution of the Alternative I (base case) is expected to include <50 percent of the mortality and <1 percent of the habitat loss.</p>

NONENDANGERED MARINE MAMMALS (PINNIPEDS, CETACEANS, AND THE SEA OTTER)

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
<p>Effects from oil spill contact are the same as the base case with a potential mortality of <10 fur seals, killer whales, and beluga whales, respectively; approximately 60 harbor seals; and between 75 to 100 sea otters. Recovery to prespill numbers is estimated to occur in about 1 to 2 years. Potential noise and disturbance effects to these marine mammals from exploration and production in these areas also would be eliminated.</p>	<p>There would be no oil-spill-associated mortality under this deferral alternative. Seismic noise associated with exploration is expected to have minimal effects on nonendangered marine mammals. Overflight-disturbance reactions probably would be short term, with seals reoccupying haulouts and whales continuing their activities usually within a matter of hours. Disturbance from habitat alteration or construction activities would be relatively short term and very localized and should not affect marine mammal survival.</p>	<p>The overall cumulative effect on nonendangered marine mammals over the 19-year life of the proposal may include fairly large mortalities of harbor seals, primarily due to commercial fishing activities. This effect could persist for several generations or longer. Mortalities to other marine mammals is expected to have minimal population level effects. The contribution of the proposal to the cumulative case is expected to be minimal with no population level effects.</p>

ENDANGERED AND THREATENED SPECIES

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
<p>Overall effects are expected to be somewhat less than determined for Alternative I (base case)—effects on whales nonlethal, Steller sea lion losses requiring at least 1 generation for recovery, Steller's eider losses requiring 2 generations for recovery. This alternative could provide limited local reduction of oil spill effects in the Barren/Shuyak Islands area and northern Shelikof Strait.</p>	<p>Only the whales and Stellers sea lions are expected to be affected from potentially disturbing activities and muds and cuttings contamination and these effects would be minimal; the potential risk from oil spills would be eliminated.</p>	<p>Compared to the Alternative I (base case), cumulative effects on (1) endangered whales is expected to be similar, (2) Steller's Sea lion are expected to be at least twice as great (because of greater oil spill mortality) and require more than 2 generation for recovery, (3) short-tailed albatross and peregrine falcon are expected to be similar, (4) Aleutian Canada goose similar if there is no accelerated loss of winter habitat, and (5) Steller's eider at least twice as great (because of greater oil spill mortality). Cumulative disturbance and other factors on fin and humpback whales is likely to be more extensive than determined for the proposed action, but they are not expected to significantly affect population distribution, abundance, or mortality.</p>

TERRESTRIAL MAMMALS

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Area)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>Overall effects on terrestrial mammals are expected to include the loss of small numbers of river otters (<50), brown bears (<10), and Sitka black-tailed deer (<100) directly killed by the assumed 50,000 bbl oil spill and assuming contact (>1%, combined probabilities) to specific coastline habitats. Total recovery of river otters and perhaps brown bears and their habitats is expected to take >1 year (perhaps 3 years), while the potential loss of Sitka black-tailed deer is expected to be replaced within 1 year. Regional populations of brown bears, river otters, black-tailed deer, and other terrestrial mammals are not expected to be affected by the oil spill or by the exploration and development activities.</p>	<p>Effects are expected to be about the same as the Alternative I (base case). Potential oil-spill effects could be reduced locally in the Tuxedni and Chinitna Bays area, Alaska Peninsula, and Kachemak Bay from a potential platform spill; but a potential pipeline or tanker spill still would pose some chance of contact to terrestrial mammals at these and other coastal habitats.</p>	<p>Effects are expected to be about the same as the Alternative I (base case). Oil-spill effects on brown bears, river otters, and other terrestrial mammals are expected to be reduced locally along the coast of Hallo, Iniskin, Chinitna, and Tuxedni Bays; the Nikishka area south to Kachemak Bay on the Kenai Peninsula.</p>

ECONOMY

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Area)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>Alternate I would generate changes between zero and 3% in resident employment, <3% in average income, <5 percent in cost of living, <2 percent in property tax, and <5% in sales taxes on the western side of the KPB annually for <5 years. Property-tax revenue of \$2.2 million for the KPB and \$0.4 million (in 1993 dollars) for the State would be added annually after the year 2002. A large (50,000 bbl) oil spill would generate 5,000 cleanup jobs for 6 months in the first year, declining to zero by the fourth year following the spill; the chance of one or more large (≥1,000 bbl) oil spills occurring is estimated to be 27%. Local communities would experience a doubling of housing rents for 1 year.</p>	<p>Effects are expected to be the same as for the Alternative I (base case).</p>	<p>Changes generated would be between 1 and 4% in resident employment, 3% in cost of living, and <4% in sales tax. Average income, cost of living, property taxes and property-tax revenue for the KPD and State, and jobs created and changes in housing rents as a result of a large spill would be the same as the Alternative I (base case).</p>

COMMERCIAL FISHERIES

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Area)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>Alternative I would result in economic losses to the Cook Inlet commercial-fishing industry ranging from about 15-65% per year for 2 years following a large (50,000 bbl) oil spill; one or more large (≥1,000 bbl) spills have a 27% chance of occurring.</p>	<p>Economic losses to the Cook Inlet commercial fishing industry are expected to be the same as the Alternative I (base case).</p>	<p>Economic losses to the Cook Inlet commercial fishing industry are expected to be the same as the Alternative I (base case).</p>

SUBSISTENCE-HARVEST PATTERNS

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Area)	Alternative V (Coastal Fisheries Deferral Alternative)
<p>Subsistence harvests would be reduced or substantially altered by as much as 50% in one or more southern Kenai Peninsula communities for at least 1 year and to a lesser extent for selected subsistence resources 2-3 years beyond; effects are caused by one or more large (≥1,000 bbl) accidental oil spills which have a 27% chance of occurring.</p>	<p>Effects are expected essentially to be the same as the Alternative I (base case).</p>	<p>Effects are expected essentially to be the same as the Alternative I (base case), although deferral of a substantial number of blocks near shoreline or island groups could reduce the potential for effects on subsistence harvests.</p>

TERRESTRIAL MAMMALS

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
<p>Effects are expected to be about the same as the Alternative I (base case). Oil-spill effects on brown bears, river otters, and other terrestrial mammals are expected to be reduced locally along the coastline of Hallo Bay and Cape Douglas and, to a lesser extent, along the coast of Afognak and Shuyak Islands.</p>	<p>This alternative is expected to greatly reduce the potential effects of the Alternative I (base case) ; populations of terrestrial mammals are not expected to be affected. Overall effects are expected to include the displacement of very small numbers (< 10) of brown bears, river otters, or other terrestrial mammals within 1 mi of support facilities in the Kenai/Nikiski area or along traffic routes nearshore.</p>	<p>Overall cumulative effects are expected to include the long-term (several generation) loss of old-growth-forest habitat (perhaps several thousand acres), increased human access and disturbance resulting in increased mortality, reduced distribution and reduced abundance of brown bears and to a lesser extent reduced numbers of river otters due to oil spill losses (perhaps as many as 100) and the loss of a number of black-tailed deer (perhaps as many as 100) from oil spills and reduced productivity from forest habitat loss. Total recovery is expected to take several generations. The contribution of the Alternative I (base case) to the cumulative case is expected to be 50 % or less of the mortality, < 1 percent of the habitat loss, and no effect on regional populations of terrestrial mammals.</p>

ECONOMY

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
<p>Effects are expected to be the same as the Alternative I (base case).</p>	<p>Change generated would be < 1 % increase in resident employment, resident income, local prices, and local taxes in the KPB annually for <3 years.</p>	<p>Changes generated would be increases of between 1 and 4% in resident employment, <6 percent in cost of living, <3 percent in property tax, and <5 percent in sales tax on the western side of the KPB annually for < 5 years and 1% for another 15 years. Property tax would increase \$2.2 million for the KPB and \$0.4 million for the State (in 1993 dollars) annually after the year 2002. A large oil spill would generate 5,000 cleanup jobs for 6 months in the first year, declining to zero by the fourth year following the spill. Local communities would experience a doubling of housing rents for 1 year.</p>

COMMERCIAL FISHERIES

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
<p>Economic losses for the Cook Inlet commercial fishing industry are estimated to be similar to the Alternative I (base case).</p>	<p>Economic losses for the Cook Inlet commercial fishing industry are estimated to be about one-half those of Alternative I (base case).</p>	<p>Economic losses for the Cook Inlet commercial fishing industry are estimated to be about twice those of the Alternative I (base case). Alternative I economic losses to commercial-fishing industry would range from about 15-65% per year for 2 years following a large oil spill.</p>

SUBSISTENCE-HARVEST PATTERNS

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
<p>Effects are expected essentially to be the same as the Alternative I (base case), although deferral of all southern blocks near Cape Douglas could provide a measure of protection for subsistence resources, especially marine mammals, which use pollock as a primary food source.</p>	<p>Effects would be localized, of short duration, and not of such an extent to create measurable changes in the availability or accessibility of subsistence resources.</p>	<p>Subsistence harvests would undergo continuing disruptions and periodic reductions over time and be reduced by as much as 50% in 1 or more Kodiak Island and lower Cook Inlet communities for at least 1 year and to a lesser extent for selected resources 2-3 years beyond; effects are caused by 2 or more large (≥1,000 bbl) oil spills which have a 64% chance of occurring. The base case contributes primarily to effects in lower Cook Inlet communities.</p>

SOCIOCULTURAL SYSTEMS

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
One or more southern Kenai Peninsula communities would undergo periodic episodes of increased individual, social, and institutional stress and disruption that could last for 1 year, or more; effects are caused by one or more large ($\geq 1,000$ bbl) accidental oil spills which have a 27% chance of occurring.	Effects are expected essentially to be the same as the Alternative I (base case).	Effects are expected essentially to be the same as the Alternative I (base case).

ARCHAEOLOGICAL AND CULTURAL RESOURCES

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
The effects of cleanup activities, vandalism, and wear and tear on archaeological sites and shipwrecks on the shore and within the State's 3-mi zone over the duration of the lease would affect <3 percent (an estimated <30 sites) of those resources.	Effects are expected to be the same as the Alternative I (base case).	Effects are expected to be the same as the Alternative I (base case) but fewer (about 5) archaeological sites and shipwrecks would be affected.

NATIONAL PARKS AND WILDLIFE REFUGES AND RECREATIONAL AREAS

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
Effects of a large (50,000-bbl) oil spill are expected to very slightly reduce visual qualities and slightly reduce visitor rates for a year following the spill; <3% of the physical and biological resources would be affected for about 3 years. The chance of one or more large ($\geq 1,000$ bbl) oil spills occurring is estimated to be 27%. Recreational fishing would drop slightly in areas affected by a spill for a year or two after the spill. The effects of oil-spill cleanup activities are expected to be greater than the effects of the oil spill.	Effects are expected to be the same as the Alternative I (base case)	Effects are expected to be the same as the Alternative I (base case)

AIR QUALITY

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
Effects on onshore air-quality standards is expected to be minimal and not sufficient to harm vegetation; Alternative I air emissions are expected to be 17.2% of the maximum allowable PSD Class I increments and would not make the concentrations of criteria pollutants in the onshore ambient air approach the air-quality standards. A light, short-term coating of soot over a localized area could result from oil fires.	Effects are expected to be the same as the Alternative I (base case)	Effects are expected to be the same as the Alternative I (base case)

COASTAL ZONE MANAGEMENT

Alternative I (Base Case)	Alternative IV (Wildlife Concentration Deferral Alternative)	Alternative V (Coastal Fisheries Deferral Alternative)
A potential for conflict with the habitat standard was identified, primarily as a result of habitat effects of a large (50,000-bbl) oil spill; the chance of one or more large ($\geq 1,000$ bbl) oil spills occurring is estimated to be 27%.	Effects are expected to be the same as the Alternative I (base case).	Effects are expected to be the same as the Alternative I (base case) although localized reductions in important habitats in Cook Inlet and Shelikof Strait are expected.

SOCIOCULTURAL SYSTEMS

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
Effects are expected essentially to be the same as the Alternative I (base case).	Little or no effects on sociocultural systems are expected.	One or more southern Kenai Peninsula and Kodiak Island communities would experience seasonal and cyclical change over time and undergo periodic episodes of increased individual, social, and institutional stress and disruption that could last for 1 year, or more; effects are caused by two or more large ($\geq 1,000$ bbl) accidental oil spills which have a 64% chance of occurring. The base case contributes primarily to effects on Kenai Peninsula communities.

ARCHAEOLOGICAL AND CULTURAL RESOURCES

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
Effects are expected to be the same as the Alternative I (base case) but fewer (about 10) archaeological sites and shipwrecks would be affected.	Effects would be due to exploration activities and indiscriminate contact with archaeological sites and affect an estimated ≤ 1 percent of the archaeological sites and cultural resources.	Effects would amount to a total disturbance of 5 % of all the resources. Oil-spill disturbance would amount to 1-3% of the archaeological and cultural resources for each particular area contacted by a spill.

NATIONAL PARKS AND WILDLIFE REFUGES AND RECREATIONAL AREAS

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
Effects are expected to be the same as Alternative I (base case)	Effects would be from exploration activities and have minimal impacts of visual qualities, visitor rates and biological and physical resources.	Effects would amount to a disturbance of about 5% of all resources. Disturbances from a large oil spill would effect 1-3% of the resources and recovery would occur in 3 years. About 50-60% of the effects are attributable to the Alternative I (base case)

AIR QUALITY

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
Effects are expected to be the same as the Alternative I (base case)	Effects are expected to be about one-third those of the Alternative I (base case).	Effects are expected to be the same as the Alternative I (base case)

COASTAL ZONE MANAGEMENT

Alternative VI (Pollock-Spawning Area Deferral Alternative)	Alternative VII (General Fisheries Deferral Alternative—Exploration Only)	Cumulative Case
Effects are expected to be the same as the Alternative I (base case).	Effects are expected to be the same as the Alternative I (base case), although localized reductions in important habitats in Cook Inlet and Shelikof Strait are expected.	Potential conflicts with the Statewide standards and district policies of the ACPMP are comparable to those in the Alternative I (base case). Additional policies are applicable and emphasize consideration of cumulative effects in decisionmaking, especially those effects associated with air and water quality.

Endangered Species Act
Section 7 Consultation
Biological Opinion

Consultation Requested By Minerals Management Service,
Department of the Interior

Biological Opinion Prepared By National Marine Fisheries
Service, Alaska Region

Subject of Consultation Oil and Gas Leasing and Exploration in
the Cook Inlet\Shelikof Strait Planning
Area: Lease Sale 149

Date Issued: _____

Background

On March 26, 1993, the Minerals Management Service (MMS) of the Department of the Interior (DOI) requested formal consultation under Section 7 of the Endangered Species Act (ESA) concerning Outer Continental Shelf (OCS) Oil and Gas Lease Sale 149: Cook Inlet\Shelikof Strait, currently scheduled for September 1994. In support of this request, MMS has prepared a document titled Biological Evaluation for Threatened and Endangered Species with Respect to the Proposed Cook Inlet\Shelikof Strait Oil and Gas Lease Sale 149. The purpose of that document is to assess the potential effects of the proposed sale on listed and proposed species and designated and proposed critical habitat and determine whether such species or habitats are likely to be adversely affected.

National Marine Fisheries Service (NMFS) has issued Biological Opinions on several sales in this general area including one issued on May 23, 1980, for Lease Sales 46 (Kodiak), 55 (Eastern Gulf of Alaska), and Cook Inlet-Shelikof Strait Sale 60 (USDOC 1980). A subsequent opinion in January 1984 concerned the Gulf of Alaska/Cook Inlet planning area (USDOC 1984).

NMFS has reviewed the information provided on the current proposed sale, potential exploration activities which would result from this sale, and recent information available on threatened or endangered species that may be present in the proposed lease area and may be affected by these activities. This opinion is for the leasing and exploration phase in the Sale 149 planning area. Although development and production activities will be subject to additional formal consultation, this opinion analyzes these phases based on the most likely probability as developed by MMS. Any conclusions as to the effects of development, production, and transportation on listed species are speculative and subject to additional consultation. However, we present this full analysis (as required under 50 CFR 402.14(k)) in order to consider the impacts of exploration if full development were to take place.

Project Area

The proposed sale area (Fig. 1) is in south central Alaska and (Alternative 1) consists of about 761 blocks from Cook Inlet near Kalgin Island (60.3 N 152.2 W) south and west through Shelikof Strait (57.3N 155.8W). The total area for leasing encompasses about 3.7 million acres, located between 3 and 24 miles offshore in water depths from 1 foot to over 1,300 feet.

Proposed Activities

Leasing and Pre-exploration Stages

Pre-exploration activities may involve geophysical seismic exploration, geological core sampling, rock dredging, or bottom grabs or sea bed boring with rotary drills. Noise and disturbance may result from these activities as well as from the increase in vessel traffic associated with these activities. Other activities associated with the lease sale include offering the leases, submission of bids and awarding of leases. The holding of the lease sale itself would have no effect on listed species or critical habitats.

Exploration Stage

Further site-specific geophysical work may be conducted on lease tracts and at drilling locations. MMS estimates that each of the three projected exploration wells would require site specific surveys covering 8.9 square miles of area for a total of 26.7 square miles of seismic survey during exploration. Marine and air support would be from Kodiak Island (a marine support facility on the west shore and air support from the Kodiak airport) and Nikiski. Both support vessel and aircraft traffic would occur throughout the lease tracts. MMS estimates 15-30 supply vessel trips and 30-60 helicopter trips per month. Exploratory drilling would be conducted between 1995 and 1997 using semisubmersible platforms, drillships, or jackup rigs in more shallow waters. Discharge of drilling fluids (including muds and cuttings) and other platform discharges would also occur. There is also a potential for oil spills.

The current resource estimate of recoverable oil is 160 million barrels (MMbbls). The marginal probability of discovering recoverable oil reserves in the sale area is less than one percent (MMS, 1993).

Oil Spill Risks

Past exploration drilling on the Alaskan OCS has resulted in a total of 5 spills for a total volume of 45 bbl (MMS, 1993a). No large oil spills have occurred in U.S. waters during exploratory drilling. MMS has assumed the probability of an oil spill occurring during exploration to be zero. MMS has also modeled spill probabilities for development and production scenarios as part of the draft EIS analysis. The Oil Spill Risk Analysis model estimates 2.0 spills of at least 1,000 bbl* with an 86 percent chance of occurrence for the cumulative case (the cumulative case assumes development of both northern and southern Federal scenarios, State tracts over the 30 year planning period, development of the Sunfish discovery, and existing oil shipping into and from the region). Estimates for the base case (exploration of the lease area in Figure 1 and drilling 8 wells from a single drilling vessel and production to 2019) are much lower: for southern and northern scenarios, 0.40 spills, 33 percent chance of occurrence, and 0.26 spills, 23 percent chance of occurrence respectively.

Biological Information

WHALES

NMFS has responsibility for seven endangered whale species (gray, right, blue, fin, sei, sperm, and humpback) that occur in the Gulf of Alaska region. Information on the distribution, abundance, and biology of these whales has been summarized previously (USDOC 1991, Morris et. al., 1983). Table 1 summarizes information on threatened and endangered species within the sale area. NMFS published a determination in the Federal Register (58 FR 3121) to remove the gray whale from the threatened or endangered species list, as its population has grown to a level at which the species is now fully recovered. Because the de-listing process has not been completed, consideration of the gray whale is included in this opinion. Also, the Cook Inlet population of the beluga whale, which occurs within the sale area, will be included in this discussion because it has been identified as a candidate species for listing under the ESA (June 11, 1991, 56 FR 112?). Its small population is believed to be restricted to waters of Cook Inlet and the immediate waters of the northern Gulf of Alaska. Its population is currently estimated at 650 animals (NMFS 1992). Because

Federal Agencies are encouraged to take candidate species into account in project planning, we are including recommendations intended to improve understanding of the Cook Inlet beluga whale within the sale area.

* The MMS has assumed the spill for this scenario to be 50,700 bbl, based on the average pipeline, platform, and tanker spill.

Potential Impacts On Endangered Whales

Impacts to endangered whales during pre-exploration activities could result from noise and disturbance caused by seismic geophysical sampling and vessel traffic. There is a remote possibility of collisions between vessels and whales. Seismic operations would continue during the exploration phase. Additional noise and disturbance could be caused by exploratory drilling, including machinery noise from the rigs and from support vessel and aircraft traffic.

Activities elsewhere have indicated that vessel and aircraft traffic or certain drilling noise frequencies may alter whale behavior (Richardson, 1983; Malme et. al., 1983) and may result in disruption of feeding activity, interference with socialization and communication, general stress increase, and abandonment of traditional use areas (Fraker and Richardson, 1980; Fraker et. al., 1981 and 1982; Richardson and Green, 1983). Richardson et. al., (1991) reported variable reactions of baleen whales to aircraft, depending on the activities and situations of the whales. Whales actively engaged in feeding or social behavior often seemed relatively insensitive to aircraft. Conversely, whales in confined waters, or those with calves, were reported as comparatively responsive. Gray whales have shown considerable tolerance to vessels in wintering areas of southern California and Mexico. Little information exists to describe their reactions during migrations or on summering grounds. Wyrick (*in* Richardson et. al., 1991) reported that gray whales changed course at a distance of 200-300 meters in order to move around a vessel in their paths. Investigators have noted the gray whales' continued use of traditional migratory corridors (e.g. along the western coastline and Unimak Pass) despite intense vessel traffic.

Deep seismic geophysical surveys using airguns produce the loudest noises among the activities (Richardson, 1983; Reeves et. al., 1983; Richardson et. al., 1991) and would probably affect whales at the greatest distances from the noise source. Reactions of whales to seismic operations have received considerable attention. Research has found whales often react to seismic (airgun) blasts at a distance of several kilometers. These reactions are short-lived, ranging from strong avoidance to more subtle changes in dive patterns or respiration rates. Long-term effects of seismic operations are largely unstudied.

Although unlikely to occur during exploration, adverse impacts to endangered whales could result from an oil spill. Potential effects of oil spills on whales may include: (1) fouling of the feeding mechanism (i.e., baleen plates); (2) ingestion of oil with effects on whale physiology; (3) a reduction of food supplies through contamination or decrease in prey abundance; (4) irritation of skin, eyes, and mucous membranes; and (5) damage to respiratory systems (Geraci and St. Aubin, 1980, 1982, 1990), as well as potential harassment during clean up actions. However, the extent of oiling that would be necessary to produce these effects is unknown. Experiments summarized by Geraci and St. Aubin (1982, 1985, 1986) demonstrate that effects of actual oiling of certain marine mammals can be short-term, transient, minor, and reversible. Geraci and St. Aubin (1990) conclude it is improbable that a species or population of cetaceans would be disabled by a spill at sea.

However, Dahlheim (1993) observed 258 humpback whales in the Kodiak Island vicinity during 1992 surveys, with localized concentrations north of Raspberry and Afognak Islands, within the Sale area. This represents a substantial percentage of the north Pacific population (est. <2,000), and may indicate important foraging habitat. A significant spill could alter the behavior of these whales or impact prey species, potentially affecting their recovery. Drilling discharge may affect local water quality and food supplies to a limited degree. Such changes would not be noticeable beyond a limited distance from the discharge site (NRC, 1983).

Collision of whales with drilling platforms are unlikely. Any increases in the risk of collisions with vessels is likely to be minor, as fishing vessel traffic is common to the area.

Cumulative Effects

Cumulative effects may result from the combination of OCS activities in this area and other areas along the whales migratory routes. The gray whale, in particular, is currently exposed to OCS activities along major portions of its migratory path. Off the California coast, oil and gas exploration, development, and production are ongoing and additional lease sales are planned. The proposed activity could expose gray whales to potential impacts during their annual migrations. OCS activities in the Gulf of Alaska, in combination with impacts from other OCS projects, may adversely affect the population. Gray whales may migrate in large numbers through OCS lease areas located nearshore. Gray whales may be able to accommodate increased industrial activity to some degree, as evidenced in California waters (Malme et. al., 1983). Their level of tolerance cannot be predicted and, as additional sources of stress and other impacts appear, concerns for cumulative effects may become more important. At present, we are unable to foresee whether the Sale 149 activities might produce levels of impacts that would lead to an increased concern about cumulative effects to gray whales.

Other species of endangered whales found in the Gulf of Alaska are less exposed to OCS activities. Most leave the continental shelf for wintering areas farther offshore, where OCS activities are neither occurring or foreseen. Individuals of some species (i.e., fin, humpback, and right whales) in the Gulf of Alaska may also enter other Alaskan waters which may experience OCS developments, potentially becoming exposed to cumulative impacts. However, based on our knowledge of the patterns of seasonal co-occurrence of individuals of these species in both regions, interchange is unlikely to occur to any large extent.

Conclusion

Based on our knowledge of the occurrence and biology of endangered whales in the Sale 149 planning area, and of the proposed locations and levels of exploratory activities that may take place, NMFS concludes OCS leasing and exploration activities are not likely to jeopardize the continued existence of any species of endangered whales. Specifically:

Gray Whales: MMS suggests the Sale 149 exploration activities are likely to affect a small (less than 1 percent) proportion of the Eastern Pacific gray whale population within Shelikof Strait, a secondary migrational route for the species (MMS, 1993). Gray whales may be temporarily displaced or disturbed by boat and aircraft traffic and seismic operations; however, this is expected to be a temporary effect involving only a few animals. Similarly, the small probability of oil spills during exploration and the relative tolerance of cetaceans to adverse effects from oil slicks (Geraci and St. Aubin (1982, 1985, 1986) do not indicate substantial risks to the population.

Other Whales: Because of the more widespread distributions of the six other species of endangered whales, and the potential impacts of exploration activities and potential oil spills to cetaceans (as discussed above), we conclude that impacts resulting from OCS exploration in this region would be unlikely to jeopardize the continued existence of these species. Impacts to individuals may occur, but such impacts would be unlikely to harm significant numbers of individuals and even less likely to cause deaths to individuals of these species. We caution, however, that information on stock identity or stock separation of certain species is lacking at present. Humpback whales in particular may have discrete seasonal stocks that may be locally common and vulnerable to OCS impacts. Should new information become available on stock separation and on the locations and timing of OCS exploration activities in the Gulf of Alaska, we will review this information to determine whether the conclusions drawn here remain valid.

Conservation Recommendations

In furthering the goals of the ESA to conserve and promote the recovery of endangered whale species, NMFS offers the following recommendations. Certain research may require permitting under

Federal Law, and NMFS should be consulted during study planning.

- (1) Additional research into the distribution and abundance of endangered whales in and adjacent to OCS lease areas in the Shelikof Strait/Cook Inlet area may be needed once the locations of these areas become known following the proposed lease sale. Aerial surveys, shipboard observations, as well as industry observer programs should be initiated and continued throughout the exploration phase in these areas, especially during the seasons in which exploration will be conducted.
- (2) Efforts to determine stock identity of humpback whales are needed to identify local populations of this species that may exist in OCS lease areas. Photo-identification techniques offer the best potential for addressing this question and would enhance ongoing efforts of this kind in other portions of this species' range (i.e., southeast Alaska, Prince William Sound, Hawaii, and Mexico).
- (3) We recommend guidelines be established notifying lessees, through information contained in the Notice of Sale, leases, and other operating permits, of proper actions to be taken by operators to avoid potential problems of harassment or physical harm to individuals of any species of endangered whale.
- (4) Exploratory activities provide a useful opportunity to gather additional information on the occurrence and distribution of whales in these areas. We recommend that operators be required to keep records of endangered whales sighted during exploratory activities, and report their data to NMFS, Alaska Regional Office. NMFS will furnish identification guides.
- (5) The Cook Inlet beluga whale has been identified as a candidate species for listing under the ESA. Little is known of the abundance, distribution, or feeding habits of the Cook Inlet beluga whale during winter months. It is believed these animals leave upper Cook Inlet in autumn, moving to the lower Inlet and Shelikof Strait. We recommend MMS initiate research on the seasonal use of the sale area by these animals.

STELLER SEA LIONS

The breeding range of the Steller sea lion extends around the North Pacific Ocean rim from the Kuril Islands and Okhotsk Sea, through the Aleutian Islands and southern Bering Sea, along Alaska's southern coast, and south to California (Kenyon and Rice, 1961; Loughlin et. al., 1984). The centers of abundance and distribution are the Gulf of Alaska and Aleutian Islands, respectively. Rookeries are dispersed from the central Kuril Islands (46 N) to southern California (37 N). Most large rookeries are in the Gulf of Alaska and Aleutian Islands (Calkins and Pitcher, 1982; Kenyon and Rice, 1961; Loughlin et. al., 1984). Northern sea lions are not known to migrate but disperse widely during the postbreeding season. Animals marked at various Gulf of Alaska rookeries have been sighted in southeast Alaska; some marked in British Columbia were seen at Cape St. Elias, Alaska; some tagged in the eastern Aleutians were seen in eastern Bristol Bay, Alaska, and some marked in Oregon were seen in southeast Alaska (NMFS, 1992a).

Adult breeding animals and some subadults occupy rookeries during the breeding season which extends from late May to early July (Pitcher and Calkins, 1981). Nonbreeding males, some subadults, and transient females may be seen at separate haul-out sites. Rookeries and haulout sites are generally characterized by minimal disturbance, access to the sea, and local abundance of food (Mate, 1973).

Sea lions are opportunistic predators and feed primarily on fish and cephalopods, with prey varying by area, season, and water depth. Sea lions' prey includes fishes of the families Gadidae, Clupeidae, Osmeridae, Salmonidae, Cottidae, Scorpaenidae and others, as well as cephalopods, decapods, and marine mammals (Lentfer, 1988; NMFS, 1992a) Food requirements for northern sea lions are estimated at 2 to 6 percent of

body mass per day. Fiscus and Baines (1966) reported one stomach to contain food amounting to 9.4 percent of total body mass.

Population Trends

Population estimates for northern sea lions are usually based on counts of animals hauled-out on land, principally during the breeding season. Since 1975, numbers have declined throughout the Alaska region, with the greatest declines in the Aleutian Islands and central Gulf of Alaska (-77 percent) (Sease et. al., 1993). Counts of adults and pups at Marmot Island during 1986 and 1987 indicate that the decline is continuing. The number of pups counted at Marmot Island in 1979 was 6,741. In 1986 the number of pups at Marmot Island declined to 4,286, and in 1987 the count was only 2,910. Pup counts had decreased to approximately 1,600 by 1991-92 (Sease et. al., 1993). The reasons for the decline are not yet fully understood. Reduced juvenile survival is considered a significant factor. Calkins and Goodwin (1988) found sea lion weight had dropped when comparing animals from the 1970's to those collected in 1985-86; indicating nutritional stress. As a result of these declines the NMFS listed the Steller sea lion as a threatened species and initiated measures to protect the animal (55 FR 46523, Nov. 5, 1990; 50 CFR 227.12).

Sea Lions Within the Sale Area

Steller sea lions are common to the waters of the central Gulf of Alaska. Rookeries occur at Outer, Sugarloaf, Marmot, Chirikof, and Chowiet Islands. Many haul-outs are found along the Kodiak island group and throughout Shelikof Strait. The most recent index count for this statistical region, the central Gulf of Alaska, is 7,330 animals (Sease et. al., 1993).

Potential Impacts to Sea Lions

Effects of Oil

Adult sea lions may not be seriously affected by contact with oil. These animals rely on a thick subcutaneous fat layer for insulation, rather than a protective pelage, such as the fur seal or sea otter, which loses its insulative properties upon oiling. Thus, adult sea lions are unlikely to suffer significant body heat loss from oil spill contact (Kooyman et. al., 1976; Hansen, 1985; Geraci and St. Aubin, 1990). Additionally, the absence of grooming behavior lessens the chance of ingestion of oil. Inhalation of vapors is unlikely to present significant threat to these animals, although individuals weakened by parasitism, pre-existing metabolic disorders and other stress may be sensitive and predisposed to adverse effects. Conjunctivitis or skin irritation may result from prolonged exposure to oil. These conditions may increase physiological stress and contribute to the death of weakened or severely contaminated animals (Geraci and St. Aubin, 1980). Sea lion pups are vulnerable to oil, as they rely on hair for thermal protection. The pups' coats may become oiled through direct contact with oil on the beach or by transfer from the mother. The resultant loss of insulation would be stressful and potentially fatal to the pup.

Noise Disturbance

Sea lions are easily disturbed while on haulouts and rookeries. Calkins (1983) found sea lion reaction to vary with the type of aircraft, and that helicopters had the most severe effects. On haulouts where sea lions are not breeding and pupping, approaching aircraft will cause disturbance. Reactions may vary from frightening the animals to mass panic and stampeding into the water, which could result in the trampling and killing of pups. During pupping and breeding seasons, territorial males and females with pups may remain on shore while immature males and pregnant females may enter the water.

Regular disturbance could cause the abandonment of traditional haulouts and breeding areas, as has been suggested for walrus (Frost et. al., 1983), spotted seals (Cowles et. al., 1981), and harbor seals (Allen et. al., 1984). Such an effect would be particularly alarming in view of the current population trends and the limited number of rookeries throughout the range of the Steller sea lion. The most probable source of

disturbance for the exploration phase would be frequent helicopter and fixed wing air traffic between Kodiak or Nikiski and the drilling rig(s). The MMS projects 30-60 flights per month would be necessary to support exploration drilling. Minimum flight separations are proposed to reduce the likelihood for disturbance.

Disturbance of sea lions offshore in the sale area is not expected to be significant. Vessel traffic will increase with exploration in terms of seismic surveys and drillship support. MMS projects 15-30 supply boat trips per month and approximately 300 miles of seismic line survey during exploration. Fishing vessels are common to the area and the additional traffic would be unlikely to have any adverse effects. While at sea, sea lions are tolerant of close and frequent approaches by vessels (Johnson et. al., 1989). On land, any effects would be minimized as vessel restrictions are in place for a 3 mile radius around Marmot and Sugarloaf rookery areas.

The effects of impulsive seismic noise on sea lions are largely unstudied. Seismic surveys using airguns emit low frequency sound that is generally well below the sensitivity range of pinnipeds and unlikely to cause damage to them, although these devices may cause some level of disturbance, (MMS, 1990b). Burns et. al., (1982) found ringed seals were not appreciably displaced by offshore seismic activity. Similarly, relatively little information is available about the reactions of pinnipeds to drilling operations. Sea lions were said to be common around production platforms off California and in Cook Inlet (*in* Richardson et. al., 1991).

Critical Habitat

On April 1, 1993, the National Oceanic and Atmospheric Administration issued a proposed rule to designate certain areas as critical habitat for the Steller sea lion, as provided for under the ESA. Four designated critical habitats occur in and near the planning area. These include three major rookery sites (Outer Island, Marmot Island and Sugarloaf Island) and a foraging area (Shelikof Strait). A 20 NM seaward boundary has been established for these areas. For other important sea lion habitats, seaward buffer zones of 3 NM have been established (50 CFR 227.12). It is unlikely that support vessel traffic would impact these habitats. Likewise, air support is estimated at one to two helicopter trips per day, and the flight paths should not approach these rookeries. Seismic operations are unlikely to disturb animals on land. Seismic guns may cause local and temporary disturbance of sea lions at sea, however the 3-mile vessel exclusion zone would reduce this concern somewhat.

The combined probability of an oil spill occurring and reaching critical habitats has been considered by MMS. It found that any spill within the sale area could contact one or more sites of sea lion concentration, and that the pelagic waters of Shelikof Strait had the highest probability (6-9 percent) of contact. While the probability of a tanker spill was considered low (estimated no. equals 0.19), MMS found a 23 percent chance of such a spill contacting Marmot Island. A tanker spill in the Kennedy/Stevenson Entrance areas would have a high probability of contact with Sugarloaf Island. Spills in open water could contact adult animals, but sea lions would not be concentrated in these areas and mortalities are expected to be low. The combined probabilities of a spill occurring and contacting any of these critical habitats remain very low (0-3 percent for Sugarloaf and Marmot Islands, 0-9 percent for southern Shelikof Strait).

Shelikof Strait was proposed as critical habitat based on its proximity to these rookeries and important haulouts, its use by foraging sea lions, and its value as an area of high forage fish production. Loughlin and Nelson (1986) report stomach contents from 36 sea lions taken between 1983 and 1984 indicated the sea lions were feeding on pollock similar to the size being taken by the commercial fishery. These observations confirmed Alaska Department of Fish and Game's aerial survey results which identified Shelikof Strait as an important foraging area for Steller sea lions in the central Gulf of Alaska, especially in years when pollock are abundant in these waters.

Large spawning concentrations of walleye pollock have been found in Shelikof Straits, and the commercial fishery has grown substantially, quadrupling between 1972 and 1980 (Megrey, 1988). Any impacts attributable to oil and gas development which adversely affect the forage fish resource within

Shelikof Strait would also be likely to adversely modify this critical habitat. Pollock embryos exposed to Cook Inlet crude were found to have impaired development leading to abnormalities after hatching (Carls and Rice, 1989). While oil spilled in the marine environment rarely reaches concentrations necessary to cause these effects (0.4-2.3 ppm), spilled oil concentrates in surface layers where pollock eggs and larvae are most abundant (Carls and Rice, 1989; Kendall and Picquelle, 1990). Pollock larvae may be more sensitive than embryos to brief exposure to oil. Concentrations of hydrocarbons in seawater can reach levels capable of impeding larval swimming or causing direct mortality (Carls and Rice, 1988). Again, the probability of an oil spill during exploration is low, and the forage resource base within Cook Inlet/Shelikof Strait is unlikely to be impacted to the point of adversely affecting this critical habitat. Because drilling muds are rapidly diluted and have low toxicity, they are probably not toxic to planktonic larvae (Rice et. al., 1983). Due to low initial concentrations and a significant dilution factor, it is unlikely drilling rig discharges would adversely impact pollock or other forage fish production.

Other areas near Shelikof Strait are also important for sea lion forage fish production. Kamishik Bay in particular is heavily used by spawning herring between April and May. Larval stages of herring are thought within Kamishik Bay as they develop before migrating south into Shelikof Strait (ADF&G, 1992). Herring were found to be adversely affected by the 1989 Valdez oil spill, which produced higher egg mortality and induced higher levels of genetic damage and physical abnormalities within oiled areas when compared to non-oiled areas. (Biggs and Baker, 1993).

Cumulative Impacts

Any significant impacts to the Steller sea lion resulting from exploration activity in the Lease Sale 149 area would add to the effect of state offshore oil and gas development, commercial fishing, and subsistence hunting on sea lions in the central Gulf of Alaska. Incidental mortality due to commercial (trawl) fishing has been investigated by Loughlin and Nelson (1986). Within Shelikof Strait, estimated kills during the 1982, 1983, and 1984 season were 959, 216, and 237 sea lions, respectively. Recently, the reported number of incidental mortalities has been much lower, now approaching zero (Zimmerman pers. comm.). Sea lions are still hunted by Alaska natives for subsistence, with annual harvests reported between 50-200 animals for the region (Haynes and Mishler, 1991.) Recently, subsistence harvests have declined, possibly due to declines in sea lion numbers (Mishler pers. comm.).

Without a clear understanding of the causative factor(s) behind the declining population, it is difficult to speculate on the potential for oil and gas activity to add to the cumulative impact on sea lions. Nonetheless, any increase in disturbance to these animals could slow the recovery of the population. Further decline in the number of Steller sea lions and reclassification of the species as endangered would necessitate re-analysis of the effects of OCS activities to this population.

Conclusions

NMFS has responded to the alarming decline in the northern sea lion by listing the species as threatened. Exploration activities present several aspects potentially harmful to sea lions. Paramount among these are the impacts to animals on rookeries and haulouts resulting from aircraft operations and oil spills, and the cumulative effects of OCS activity, commercial fishing, and other human activity. We believe that aircraft operations should be conducted in a manner that minimizes disturbance to sea lions by observing minimum flight separations and restricting traffic over certain sites. Adherence to such restrictions, and enforcement of violations present special problems which MMS should consider.

The potential effects of a spill contacting a haulout or rookery are significant. However, the probability for oil spills during exploration is small, and the combined probability of an oil spill occurring and impacting these sites is remote. The potential for exploration activities to contribute to the cumulative adverse impact to these threatened species may be significant. Our present knowledge regarding the various factors which may be affecting sea lion populations is not sufficient to quantify potential cumulative impacts.

Based on the available information regarding the Steller sea lion and the anticipated impacts of the exploration phase of Lease Sale 149, we do not believe this action is likely to jeopardize the continued existence of the species. Also, we find the proposed exploration activities are not likely to destroy or adversely modify Steller sea lion critical habitat areas.

Conservation Recommendations

In furthering the purposes of the ESA to conserve and promote the recovery of Steller sea lions, NMFS offers the following recommendations.

- (1) All aircraft should maintain flight separation distances of 1,500 feet vertical and 0.5 mile horizontal over the following sea lion haulouts and rookeries:

Outer Island, Perl/Nagahut Rocks, Sugarloaf Island, Sud Island, Ushagat Island and Rocks, Latax Rocks, Sea Otter Island, Seal Rocks, Marmot Island, Sea Lion Rocks, Cape Ugat, Shakun Rocks, Cape Nukshak, Cape Ugat, Cape Gull, Cape Kuliak, Cape Ikolik, Takli Island, and Puale Bay.

- (2) No vessel shall approach within 3 miles of Outer, Sugarloaf and Marmot Islands.

OTHER LISTED SPECIES

Currently, four separate stocks of Pacific salmon are listed as threatened or endangered under the ESA. These are the Snake River sockeye, spring/summer chinook, fall chinook, and Sacramento River winter-run chinook. After smolting, these stocks move into the north Pacific and may occur within the Gulf of Alaska and the Sale 149 area. However, because these adult fish occur in such low densities in the area of the lease sale, it is unlikely that they would be adversely affected by any exploration activities.

Later Phases of OCS Activity

Development and production within the Sale 149 area is projected to involve approximately 1,200 miles of seismic survey, one production platform, 26 production and service wells, 30-60 supply vessel trips per month, and 60 helicopter trips per month (MMS 1993). Drilling muds, cuttings, and formation waters would be discharged from the drill rig. Depending on the location, oil would be brought ashore via pipeline, possibly requiring barge shipment to Nikiski (est. 3 trips per week).

MMS currently estimates the probability of a substantial oil spill (i.e. >1,000 bbl) occurring (for the southern scenario; platform, tanker, and pipeline combined) is about 5 percent for two such spills, 27 percent for a single spill, and 68 percent for no spills. For spills less than 1,000 bbl but greater than one barrel, MMS estimates 17 events totaling 257 barrels. Conditional probabilities of oil spilled at various locations within the lease area contacting land or biological resource areas vary, but are generally extremely low (e.g. 3 percent for the Barren Islands; 1 percent for Marmot Island). However, a worst-case scenario could present the possibility of contact with important resource areas, including the Marmot and Sugarloaf Island rookeries. A significant spill event within the sale area during periods of pollock egg or larval concentrations could cause direct mortalities, impair development, and reduce survival. This may result in reductions within one or more year classes of forage fish within the Shelikof Strait critical habitat, and a subsequent impact on the corresponding group of juvenile Steller sea lions, the age group that appears to most strongly reflect the current decline in the abundance of the population.

The later phases of activities for Sale 149 present a higher probability of oil spills from platforms or vessels. However, the type of expected impacts due to disturbance or possible oiling of listed species and critical habitat would be similar to those associated with the exploration phase of this Lease Sale, as discussed earlier. While consultation will be reinitiated for any subsequent phases, NMFS does not believe

the most-likely scenario for development and production presents a high probability of these activities jeopardizing listed species or adversely affecting critical habitats.

Opportunities for Additional Consultation

During the post-lease exploration phase, MMS should provide NMFS with all exploration plans and any subsequent revisions of these plans. MMS should review these plans to determine if further Section 7 consultation is necessary. Consultation will be re-initiated for the development and production phases. Consultation must also be re-initiated if new information reveals impacts from the proposed activities that were not previously considered, if the activities are modified in a manner that was not considered, or if a new species is listed or critical habitat is designated that may be affected by the proposed activities.

Incidental Take Statement

This biological opinion does not permit the taking of any listed species. Taking of such species, unless properly permitted, is prohibited under Section 9 of ESA and under Section 102 of the Marine Mammal Protection Act (MMPA). Section 7 (b)(4)(C) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under section 101 (a)(5) of the MMPA. Since no taking incidental to the proposed activity has been authorized under section 101(a)(5), no statement on incidental take of endangered or threatened marine mammals is provided and no take is authorized.



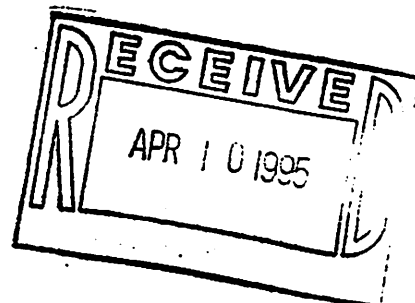
North Pacific Fisheries Association, Inc.

HEADQUARTERS:

BOX 796 • HOMER ALASKA 99603

7 April 1995

Chairman Rick Lauber
North Pacific Fisheries Management Council



Dear Mr. Lauber,

Our association has taken a position against lease/sale 149 here in the lower Cook Inlet.

The reasons for our opposition are many and varied:

- 1) This may be the most treacherous stretch of water in the north Pacific and according to the draft EIS there is a 72% chance of a spill of 1000 bbl or more.
 - 2) This area has a rich and sensitive ecosystem. Absolutely no chances should be taken with the health of this valuable area.
 - 3) Already impacted sea lion and common murre populations will be stressed by oil development.
- Etc.

We urge the council to oppose this ill-conceived off-shore oil exploration.

Thank you,

Mako Haggerty, Pres.
North Pacific Fisheries Assoc.



UNITED STATES DEPARTMENT OF THE INTERIOR
 National Oceanic and Atmospheric Administration
 National Marine Fisheries Service
 P.O. Box 21668

Juneau, Alaska 99802-1668

April 12, 1995

AGENDA C-1
 APRIL 1995
 Supplemental

MEMORANDUM FOR: Bill Archambault
 Office of Administration

FROM: Steve Pennoyer *Steve Pennoyer*
 Director, Alaska Region

SUBJECT: DEIS for Lease Sale 149 (Cook Inlet)

The Alaska Region has reviewed the subject DEIS for Lease Sale 149, currently scheduled for early 1996. Past sales in this area have generated little interest, although 14 wells have been drilled with no commercial finds. This sale reduces the area available through previous leases by eliminating tracts in Shelikof Strait. The deferral of Shelikof Strait is consistent with recommendations from NMFS, and should significantly reduce the potential effects of this sale on marine mammals and commercial fisheries.

The DEIS offers several alternatives to the base case, many of which result in reductions in projected environmental resource impacts as well as reduced probabilities of oil and gas reserves. We are recommending the adoption of one of these alternatives, Alternative V, the Coastal Fisheries Deferral. Alternative V would reduce the probability of a major oil spill from 28 per cent (the base case) to 17 per cent, while reducing resource estimates by approximately 30 per cent. Spill probabilities would be lowered in several important commercial fishery areas such as Tuxedni and Kamishak Bays. The Coastal Fisheries Deferral would increase the separation between the sale area and important marine mammal habitats such as the Barren Island group and Augustine Island. The DEIS projects this alternative would reduce risk to marine mammals, including harbor seals, whales, and sea lions, although these reductions are often modest.

Specific Comments

Page II-6. Mitigating Measures

We support the (Minerals Management Service) MMS's effort to reduce potential adverse effects from the sale through stipulations and Information to Lessees. The marine transportation phase of this sale represents the most probable source of a major oil spill. As the DEIS notes, there have been several large spills within or affecting Cook Inlet, including the 1987 Glacier Bay and the 1989 Valdez spill. Table IV.A.2-2 suggests a significant probability for a major oil spill



currently exists, without the additional contribution from Sale 149. We believe the MMS should take an active role in insuring the vessel transportation system within Cook Inlet is brought to the most practical limits of safety. This might include improvements to vessel tracking and navigational aids, assignment of transportation corridors, or requirements for vessel escorts similar to those in Prince William Sound. We encourage the MMS to work with the State of Alaska and U.S. Coast Guard to investigate means to reduce the possibility of a catastrophic tanker vessel spill.

Page III.B.1, Zooplankton

The DEIS should identify shellfish larval concentration or larval settlement areas, if known. Areas in which larval shellfish concentrations exist may also concentrate oil spills, increasing the effects of any such discharges.

Page III.B.7, Pacific Hake

This paragraph should be reviewed for accuracy. We do not believe this species is present within Cook Inlet in the numbers suggested.

Page III.B.11, Nonendangered Marine Mammals

The range and abundance estimates for the northern fur seal should be reviewed. We would not consider these animals to be seasonally abundant, in Cook Inlet, as depicted in Table III.B.4-1. They are likely to occur in the Gulf of Alaska and along the transportation corridors, as noted in Section IV.

Page III.B.12, Harbor Seals

The NMFS surveyed harbor seals in lower Cook Inlet during 1992 and obtained a mean count of 1105 animals from the Barren Islands to Anchor Point (Loughlin 1993). Population estimates between 2,380 and 3,966 were derived from these figures by Kelly et. al. 1994.

Page IV.A.3, Location of Environmental Resource Areas

It is unclear why important resource areas at the mouth of the Kenai and Kaslof Rivers and shellfish (razor clam) habitat along the east and west sides of the Inlet were not discussed here or identified in the linked tables and figures.

Page IV.A.4, Transportation Assumptions, and Table IV.A.2-2

Why are the probabilities of oil spills from the tankering of oil to Nikiski not included in the cumulative-case total?

Page IV.A.4, Combined Probabilities

What are the confidence limits for the figures presented here and in Figure IV.A.2-7 and 2-8?

Page IV.B.5-1

The NMFS believes the Coastal Fisheries Deferral presents a meaningful mitigative measure which would minimize potential impact to the Inlet's fisheries, endangered species, other marine

mammals, and important coastal resources. We recommend the MMS adopt Alternative V as the preferred alternative.

Page IV.B.1-45 Beluga Whales

While the DEIS correctly notes 242 beluga whales have been counted on a single day, this does not necessarily represent the number of whales which could occur within a spill area. This is a direct count, rather than a corrected estimate. Also, research has found the Cook Inlet beluga to be highly gregarious, and it is possible to assume the majority of the population may be found within one area, particularly during the spring and summer months. The projected spill mortality of seven whales could be a significant loss to this small population. The Cook Inlet beluga supports a local subsistence hunt, and these whales are also taken by killer whales, accidental strandings, and commercial fishing. The current removal rate has not been established, but may be quite high in view of the estimated population size.

We have recommended the MMS incorporate beluga research within the scope of their Environmental Studies Program, emphasizing population size, migrational patterns, and wintering habitat. Because the Cook Inlet beluga may be the most commonly encountered, and understudied, marine mammal potentially affected by this sale, we believe further research is important in assessing the impacts of development on these animals.

We appreciate this opportunity to comment on this draft document. Please direct any questions to Brad Smith at (907) 271-5006.

Literature Cited

Kelley, B.P., J. Anthony and L.A.Jemison. 1994. Status and Trends of Harbor Seal and Sea Otter Populations in Prince William Sound and Lower Cook Inlet, Alaska. Draft Report.

Loughlin, T.R. 1993. Abundance and Distribution of Harbor Seals (Phoca vitulina richardsi) in the Gulf of Alaska and Prince William Sound During 1992. Annual Report for 1992 under the NMFS, MMPA Population Assessment Program submitted to the Office of Protected Resources, NMFS, NOAA.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

1011 E. Tudor Rd.

Anchorage, Alaska 99503-6199

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DHC

APR 14 1995

Memorandum

To: Regional Director, Alaska Outer Continental Shelf Region
Minerals Management Service

From: ^{Acting} Regional Director *Rowan W. Gould*
Region 7

Subject: Comments on Draft Environmental Impact Statement (DEIS) - Cook
Inlet Planning Area Oil and Gas Lease Sale 149

Thank you for the opportunity to review the subject document. Previously, the U.S. Fish and Wildlife Service (Service) provided comments on other stages of the planning and leasing process for this sale, notably, July 16, 1991, (reply to Request for Information); October 1, 1991, (reply to Request for Interest and Comments); December 17, 1991, (Notice enlarging the proposed lease sale); and March 20, 1992, (reply to Call for Information and Notice of Intent to Prepare an Environmental Impact Statement).

Of the seven alternatives presented in the DEIS, the Service supports Alternative IV, the Wildlife Concentration Deferral, because of the additional protection this alternative provides to Chisik, Duck and the Barren islands, all of which are important marine bird breeding colonies in Cook Inlet. Other Alternatives, such as V and VII, defer greater numbers of coastal tracts from the lease sale area and may result in a lower probability of a spill occurring there. It is difficult to imagine those Alternatives resulting in greater protection to the coastline, however, given the dynamic nature of water movements in Cook Inlet and the likelihood that oil would spread rapidly in the inlet should a spill occur. In fact, any large spill in Cook Inlet resulting from this lease sale is likely to have widespread effects on fish and wildlife resources because of this area's importance to marine birds and mammals.

We have some additional comments on the Effects Assessment for the various Alternatives. These assessments were generally well-written but do not place the potential impacts of a large spill on marine bird and mammal resources in proper perspective considering what we know of the effects of the Exxon Valdez oil spill. For example, a large spill might have catastrophic effects on nesting seabirds in Lower Cook Inlet and along the Alaska Peninsula. Some colonies in the potential path of a Cook Inlet spill, notably those on the Barren Islands and on the Semidi Islands, are the largest of their kind in the area and are of great regional significance.

We believe the assessment downplays not only the potential impacts of a large spill, but also the amount of coastline that could be affected and the time it would take marine birds to recover from such a spill. The Alaska coastal current will have a major influence in distributing oil spilled in Cook Inlet. After the Exxon Valdez spill, oil constrained in the Alaska coastal current travelled hundreds of miles to the west, affecting seabird colonies and sea otters far removed from the spill site.

Recovery of seabird populations following an oil spill has two components: 1) a recovery of production (fledged chicks per nesting attempt) and 2) a recovery of populations. The former may occur well before the latter. In fact, population recovery will be related to the magnitude of spill-related mortality and may greatly exceed the one to three generations suggested in the DEIS. The DEIS also downplays the potential effects from disturbance at seabird colonies. It is our experience that disturbance of cliff-nesting seabirds often causes mass panic flights of adults from the colonies and results in abandonment of nests, and the mortality of eggs and chicks through being knocked off the cliff or predation by eagles and gulls. Any development related overflights or noisy boat traffic would have to give wide berth to seabird colonies.

Lastly, regarding seabirds, we wish to point out that the murre population on the Barren Islands has already been seriously affected by the Exxon Valdez oil spill and the breeding population is only just recovering. What cumulative effects would result from another oil spill reaching this colony is unclear at this time.

Sea otters also would likely be affected by an oil spill in Cook Inlet as discussed in the DEIS. Although the population data for sea otters in Cook Inlet, the Kodiak Archipelago, and along the Alaska Peninsula may be imprecise, it is safe to say that thousands of sea otters may be at risk from a large spill in the planning area. As the Exxon Valdez oil spill has demonstrated, recovery of sea otter populations from a large spill in Cook Inlet would take years. Recently, the Service conducted a population survey for sea otters in the Kodiak Archipelago resulting in a new population estimate of about 6,100 otters (Service, unpublished data). Please consult Carol Gorbics of the Service's Marine Mammals Management Office at (907) 786-3804 if you require additional details on this survey.

A number of specific comments are provided in the attachment. If you require clarification of any of our comments or additional information, please contact Tony DeGange at (907) 786-3492.

Attachment

Specific Comments

Vol. I; Figure III.A.2-7. This figure fails to identify even minor tide rips in Kennedy Entrance that are already noted on nautical charts.

Vol. I; Page III.B.13; Paragraph 3. Add "A minimum of 10 minor harbor seal haulouts and pupping areas (<100 seals) exist in bays adjacent to Shelikof Strait."

Vol. I; Figure III.C.6-1. This figure fails to identify the Foul Bay-Blue Fox Bay Unit of the Kodiak National Wildlife Refuge.

Vol. I; Figures IV.A.2-3 and IV.A.2-4. No definition of an Environmental Resource Area is given in the text or on the figures. Very little of the Kodiak National Wildlife Refuge coastline was included in the oil-spill-risk-analysis yet the majority of the biological resources present in the Kodiak area are found on refuge lands. An important Steller's sea lion haulout at Cape Ugat is not included in any of the resource areas as well as eight minor harbor seal haulouts. The environmental resource areas also fail to incorporate important fin and humpback whale foraging areas in Uyak and Uganik bays. Sea otter concentrations are present in the same areas.

We are also concerned that many drift beaches, which we know received heavy oiling from the *Exxon Valdez* spill were not used in the analysis - an obvious shortcoming of the "spill" model.

Vol. I; Page IV.B1.57; First Sentence. Change to "Humpback whales are present in this area from late May to the middle of November."

Vol. I; Graphic 4. The brown bear and Sitka black-tailed deer coastal habitat maps are grossly inaccurate for Kodiak Island. A number of key wintering locations for black-tailed deer were omitted, such as Seven Mile Beach, Olga Bay Flats, Aliulik Peninsula, and Sitkalidak Island, to name a few. The same is true with brown bear spring concentration areas along Kodiak Island's western coast. Coastal portions of Grant's, Halibut, Sulua, and Portage Bays, and the Aliulik Peninsula are used extensively by brown bear during the spring.

Vol. II; Page C-7; Paragraph 5. The mortality estimate for harbor seals does not reflect the many seals found on minor haulouts throughout the potential spill area.

Vol. II; Page C-9; Section 3. It does not appear that populations of sea otters in Viekoda, Terror, Uganik, Spiridon, Zachar, and Uyak Bays are considered in the mortality estimate. Much of this area was impacted by the *Exxon Valdez* oil spill and would likely be impacted again by a spill in the planning area.

Last Paragraph on Page C-9. The mortality estimate does not include or discuss the Cape Ugat Steller's sea lion haulout which was impacted by the *Exxon Valdez* oil spill.

Vol. II; Page C-11; Paragraph 1, Sentence 1. The conclusion that Sitka black-tailed deer are not present on the beaches of the Kodiak Archipelago during April is not true. The density of deer and their dependence on beach habitats does not notably decrease until "greenup" is well under way. Greenup usually occurs from mid to late May on Kodiak, Afognak, and Shuyak islands.

Vol. II; Page C-11; Paragraph 3. Impacts of the Exxon Valdez oil spill on river otters have yet to be fully determined or assessed, so the statement that no impacts would result is premature.

Vol. II; Page I-5; Last Paragraph, First Sentence. Change to "Fall migration occurs from September to November with some fin whales wintering in the Gulf of Alaska; however, most of the North Pacific population is believed to winter far offshore at latitudes from central California to Baja California." Winter observations of fin whales during the majority of the past 15 years would indicate this is more than a possibility.

Vol. II; Page I-13; Paragraph 1. Same comments as above.

Vol. II; Page I-18; Paragraphs 5 and 7. No suitable areas off-refuge exist along the western shore of Kodiak Island. An oil terminal is not a compatible refuge use. See the Kodiak National Wildlife Refuge Comprehensive Conservation Plan.

Vol. II; Page 39; Figure 3. No National Wildlife Refuge lands exist at the head of Izhut Bay on Afognak Island or at the head of Kaiugnak Bay on the east side of Kodiak Island. Also, many Alaska Maritime National Wildlife Refuge lands on the eastern coast of the Kodiak Archipelago are not identified.

Vol. II; Page 41; Figure 4. Two minor Steller's sea lion haulouts on the Cape Douglas reef and near Shaw Island are not identified. Each has 75-100 sea lions.

Vol. II; Page 57; Figure 5. Harbor seal haulouts in Viekoda, Uganik Pass, and Uganik Bay, accounting for several hundred animals, are not included in the figure.

Vol. II; Page 58; Figure 6. This figure is difficult to understand.



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FISH AND WILDLIFE SERVICE
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OCT 14 1994

Memorandum

To: Regional Director, Alaska OCS Region
Minerals Management Service

From: **Acting** Regional Director
Region 7

Subject: Section 7 Consultation for Natural Gas and Oil Lease Sale 149,
Cook Inlet - Draft Biological Opinion

This responds to your March 25, 1993, request for formal section 7 consultation pursuant to the Endangered Species Act of 1973 (Act) (16 U.S.C. 1531 et seq.; 87 stat. 884, as amended) for Lease Sale 149 and associated exploration activities in lower Cook Inlet, Alaska. This draft biological opinion supersedes our draft of November 22, 1993. Although this is an "incremental step" consultation on leasing and exploration, information was also provided by your office on potential development and production scenarios so that the U.S. Fish and Wildlife Service (Service) could evaluate the likelihood of the entire action proceeding without violation of section 7(a)(2) of the Act.

For a description and understanding of proposed exploration activities, the Service relied primarily on the January 1993 Biological Evaluation for Threatened and Endangered Species (Biological Evaluation) provided by your agency. Representatives of the Service's Ecological Services Anchorage field office also discussed the project with Dr. Joel Hubbard of the Alaska Outer Continental Shelf Regional Office.

The following text is organized into three main Sections: summary, exploration and leasing, and development and production. Each section describes the action, discusses the environmental baseline, and states the Service's biological opinion.

SUMMARY

The Service has evaluated, in detail, the first two increments of the proposed oil and gas development in lower Cook Inlet and found that those two increments would not jeopardize any listed species. Impacts of the full extent of oil and gas development also have been assessed, according to 50 CFR 402.14(k)(5), and at this time the Service cannot be reasonably certain that

the final increment--oil transportation--will not violate section 7(a)(2)¹ with regard to marbled murrelets (*Brachyramphus marmoratus*) and southern sea otters (*Enhydra lutris nereis*).

According to regulation (50 CFR 402.14(k)(5)), Minerals Management Service (MMS) may not proceed with, or authorize, any increments of the proposed project unless "there is a reasonable likelihood that the entire action will not violate section 7(a)(2) of the Act." The Service believes it may be possible to resolve the problems with the oil transportation increment if the U.S. Coast Guard is involved as a partner to the consultation and the issues identified on page 9 of this document are satisfactorily addressed through further consultation with the MMS, the U.S. Coast Guard, the Service's Region 1, Regional Office in Portland, Oregon, and this office.

EXPLORATION AND LEASING

Description of the Proposed Action

Originally, the proposed lease sale area encompassed lower Cook Inlet and Shelikof Strait. We were informed by a February 9, 1994, memorandum from your acting Regional Director, Alaska Outer Continental Shelf Region, of changes to the proposed lease sale, including deletion of the Shelikof Strait portion. The following project description reflects the most current information available to us.

Lease Sale 149, the fourth sale proposed for the lower Cook Inlet planning area, is tentatively scheduled for 1996. The sale will offer 403 blocks, comprising an area of approximately 2.0 million acres. The lease area is located roughly from Kalgin Island in Cook Inlet, southwest to northern Shuyak Island in the Kodiak Archipelago. The blocks lie approximately 3 to 24 miles offshore in water depths from 1 foot to greater than 1,300 feet.

A total of 312 trackline miles of shallow-hazard seismic surveys would be conducted. Although different levels of activity and a variety of exploration methods are possible, semisubmersible, drillship, or jack-up rig are the most likely drilling platforms for exploration wells. During a two-year period, a total of three exploration and five delineation wells would be drilled.

¹Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

Your Biological Evaluation describes a base-case development and production scenario which is based on a composite of feasible options developed through discussions within your agency, other agencies, and industry. It was developed for the purpose of evaluating the potential effects of the entire action associated with Lease Sale 149.

Under the production and development scenario, 1,257 trackline miles of seismic surveys would be conducted for the production platform, with an additional 100 miles necessary for the offshore pipeline. Over a three-year period, three rigs would drill 48 production and service wells to a target depth of 7,200 feet. In general, marine and air support would originate from the Kenai Peninsula.

Undersea pipelines would transport oil from production wells to storage facilities on the Kenai Peninsula. All products would be loaded onto tankers at Nikiski for trans-shipment to processing facilities in Alaska or the lower 48 states. No particular receiving ports along the west coast were specified, however, those currently in use are located in Puget Sound, San Francisco Bay, and Long Beach.

Activities interrelated and interdependent to the proposed action include oil spills originating from platforms, pipelines, or tanker vessels; and the deposition of plastic waste in the marine environment.

Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "...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."

State or private actions reasonably certain to occur within or near the proposed sale area would include State of Alaska oil and gas lease sales (nos. 67A-W, 76, 78, 85), transport of crude oil between Valdez and Nikiski or to U.S. ports south of Alaska, transport of crude oil or refined petroleum products from Cook Inlet to U.S. ports south of Alaska and to ports in the Far East, transport of liquified natural gas from Cook Inlet to the Far East, commercial fishing operations, recreational- and tourist-industry activities, and winter-habitat loss or contamination. The State of Alaska is currently considering whether holding Lease Sales 78 and 85 will be in the best interest of the State.

Environmental Baseline

The listed species of concern to the Service during the leasing and exploration phases of Lease Sale 149 are the threatened Aleutian Canada goose (*Branta canadensis leucopareia*) and the endangered short-tailed albatross (*Diomedea albatrus*). Although the endangered American (*Falco peregrinus anatum*) and threatened Arctic (*F. p. tundrius*) peregrine falcons may occur in the lease sale area during migration, their presence is considered transitory and irregular, and these species would not be affected by the proposal. No

other listed, threatened or endangered species for which the Service has responsibility are known to occur in the lease area.

The Service recently proposed that the Alaska breeding population of the Steller's eider (*Polysticta stelleri*) be listed as a threatened species (59 FR 35896). This species occurs during the winter in protected marine waters, including those of lower Cook Inlet. However, limited information is available regarding the numbers of eiders using the lease sale area. Should the Steller's eider become a listed species, MMS should consider re-initiating consultation procedures with the Service.

The harlequin duck (*Histrionicus histrionicus*), the Alaska population of the marbled murrelet, and the Kittlitz's murrelet (*B. brevirostris*) are Category 2 candidate species for listing, and may occur throughout the lease sale area. Category 2 candidates are species for which the best scientific and commercial information indicates that the species might qualify for listing under the Act, but the Service needs additional information before the need to list can be determined. Candidate species within the project area are identified for your information and environmental planning.

Aleutian Canada Goose

The Aleutian Canada goose currently nests on nine islands of the Aleutian Chain [Agattu, Alaid, Nizki, Buldir, Little Kiska, Amchitka, and Chagulak Islands] and Semidi Islands (Kiliktagik and Anowik Islands). The total population is estimated to be 15,700 birds (Dahl et al. 1994). This subspecies nests primarily on vegetated maritime slopes and, unlike many other Canada goose subspecies, does not appear to require proximity to estuarine or fresh water sources. Aleutian Canada geese begin arriving on the breeding islands in late April and depart during September and October. The migration route to and from wintering grounds in California and Oregon is not fully known, but is presumed to be trans-oceanic.

Although the lease area is generally outside the current range of Aleutian Canada geese, migrating birds have recently been reported as close as the Kalsin Bay area on Kodiak Island. It is also likely that other areas of the Kodiak Archipelago are visited occasionally during migration. This subspecies is not known to rest on salt water during migration, and therefore would not be affected by an oil spill or industrial discharges.

Located approximately 225 miles (360 km) southwest of the southern lease sale boundary, the Semidi Islands are the location of an Aleutian Canada goose breeding population consisting of 132 birds with at least 28 nesting pairs (Anderson et al. 1993). It is possible, given appropriate wind and current conditions, that a large oil spill in the lease sale area could contact the Semidi Islands. Although Aleutian Canada geese normally use only upland habitats during the nesting season, molting geese have been observed to fly from an island and alight on the sea surface when alarmed. In the event an oil spill cleanup was necessary in the Semidi Islands, this type of escape response could be prevented by human avoidance of the nesting areas.

Given the lack of major oil spills associated with exploratory drilling on the U.S. Outer Continental Shelf, the Service concurs that the likelihood of substantial quantities of oil reaching the Semidi Islands or coastal habitats potentially used by geese is negligible.

Short-Tailed Albatross

The short-tailed albatross is a pelagic seabird that nests on two islands in Japan: Torishima and Minami-Kojima in the Senkaku Islands. After being reduced to fewer than 100 birds in the 1930's, the current population has increased to approximately 500 birds with a seven percent yearly growth rate (H. Hasegawa, Department of Biology, Toho University, Japan, pers. comm. 1992).

A combination of additional birds in the population, and a greater number of informed observers has resulted in more frequent and widespread short-tailed albatross sightings in recent years. While the majority of sightings are from fishing grounds of the western North Pacific Ocean and Bering Sea, several sightings have recently been reported from the northern Gulf of Alaska and Kodiak Island continental shelf. We have no records of short-tailed albatross from the lease sale area, however, it is reasonable to assume that low numbers of this wide-ranging seabird may occasionally be present in lower Cook Inlet.

Like other albatrosses, shearwaters, and petrels, the short-tailed albatross is a surface-feeder. Hasegawa and DeGange (1982) report that much surface-feeding occurs at night when squid are close to the surface. Individual birds could potentially be harmed if they come into contact with floating oil or fuel, either from a spill during exploration drilling or leaked from support vessels or rigs.

The Service concurs with your assessment that due to the low number of individuals that would be expected to be present in the lease sale area, and the industry's record of no major spills during exploration, the potential effects of drilling would be negligible. The Service also believes that albatrosses will avoid noise generating activities, such as seismic work and helicopter traffic.

Many reported sightings of short-tailed albatrosses are of birds that have been attracted to commercial fishing vessels. Like many seabirds, albatross can become habituated to following vessels because they represent a potential food source. As surface feeders, short-tailed albatrosses are also particularly vulnerable to the harmful effects of ingesting discarded waste, particularly plastics, which can resemble natural food items. Ingestion of plastic pollutants has been recorded in 50 species of marine birds, and albatrosses are among those species found to do so most frequently (Day et al. 1985).

The Biological Evaluation suggests that encounters between short-tailed albatrosses and plastic debris would not take place in the project area because of the expected scarcity of the species. However, floating plastic debris is extremely persistent, and may disperse widely outside the lease area. While there is no reliable method for predicting short-tailed albatross

abundance in the lease area over the life of the project, it is reasonable to expect that the overall population will double in 10-12 years, and a greater proportion of its former range will be re-occupied.

Title 2 of Public Law 100-220, Marine Plastic Pollution Research and Control Act of 1987, prohibits the disposal of plastics anywhere at sea. Additionally, it is our understanding that your agency's Consolidated Offshore Operating Regulations (30 CFR 250) which discuss pollution prevention measures, prohibit the disposal of solid waste and other materials at sea. Although these measures directly address the problem, both the new law and the operating regulations may in reality be unenforceable on the high seas. Recently, Robards et al. (1991) reported increased levels of ingested plastic particles in seabirds they studied from 1988-1990.

Progress is being made by MMS and the petroleum industry to curb the disposal of plastic debris during exploration activities. An example is the Exploration Plan - West Maktar Prospect, Beaufort Sea, Alaska, (Harding Lawson Associates 1990) which specifies that solid, non-combustible waste will be stored on board the drilling unit for land disposal. The MMS's plans to adopt a similar plan for Lease Sale 149 should adequately ensure that there will be negligible risk to the short-tailed albatross from plastic pollution as a result of exploratory activities.

Biological Opinion

It is the biological opinion of the Service that the leasing and exploration phases (Incremental Steps 1 and 2) of Natural Gas and Oil Lease Sale 149 are not likely to jeopardize the continued existence of either the Aleutian Canada goose or the short-tailed albatross. No critical habitat for these species has been designated, therefore, none will be affected.

Incidental Take

Section 4(d) and 9 of the Act, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. 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 a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement. The Service does not anticipate the proposed action will incidentally take any Aleutian Canada geese or short-tailed albatross.

DEVELOPMENT AND PRODUCTION

Description of the Proposed Action

Per your March 25, 1993, request for consultation, the Service has also considered the potential effects of the development and production phases of Lease Sale 149. A projected oil volume of 160 million barrels (base case of proposal) was used to project the number of tanker/barge trips and probabilities of a spill occurring. Interrelated, interdependent, and cumulative effects are the same as those identified in the previous section.

Environmental Baseline

In addition to the species discussed above, the Service evaluated nine listed species that may be affected by the development and production phases of Lease Sale 149, particularly through the transportation of oil. Those species are the southern sea otter, brown pelican (*Pelecanus occidentalis*), California clapper rail (*Rallus longirostris obsoletus*), light-footed clapper rail (*R. l. levipes*), western snowy plover (*Charadrius alexandrinus nivosus*), California least tern (*Sterna antillarum browni*), marbled murrelet, and bald eagle (*Haliaeetus leucocephalus*). The Service concentrated its evaluation on the southern sea otter and marbled murrelet, two species which would be most directly affected by a tanker-related oil spill. Measures taken to protect these species should also protect other listed species along the coasts of Washington, Oregon, and California. In depth analysis of the brown pelican, California clapper rail, western snowy plover, California least tern, and bald eagle may be necessary as the consultation progresses.

Southern Sea Otter

The southern sea otter was listed as threatened primarily due to its small population size, extreme vulnerability to hypothermia if its pelage is oiled, and the high probability that a tanker spill would contact its limited range. Minimizing the risk of oil spills, and the effects those spills would have on the southern sea otter are among the primary objectives of the Sea Otter Recovery Plan.

Based on tanker traffic within the southern sea otter's range during 1987, the U.S. Coast Guard predicts 3 to 4 tanker spills may occur over the next 30 years (U.S. Fish and Wildlife Service 1987). Along the coast of California, the probability of a spill on the scale of the Exxon Valdez (11 million gallons) is estimated at once every 69 years (S.L. Ross Environmental Research LTD 1990). Under current traffic patterns, it is estimated that there is a 13.4 percent chance that more than 5 percent of the current southern sea otter population would be lost in a tanker spill (Public Draft, San Miguel Project and Northern Santa Maria Basin Area Study EIS/EIR, Vol. 1, Table C2.4.3-6, 1985). There is a 1 in 67 chance (1.5 percent) that more than 40 percent of the population would be lost due to spills from tankers alone. If a spill occurred in the northern half of the southern sea otter range, at least 50 percent of the breeding females would be lost (U.S. Fish and Wildlife Service 1987).

Under current vessel traffic patterns, it is questionable if an emergency response vessel could arrive in time to aid a distressed vessel. Sea-going emergency response vessels currently in service are stationed in San Francisco Bay and at Port Hueneme, California. Under the best of conditions, response times to reach a disabled tanker along the southern sea otter range could approach 17 hours (Texaco 1989). About 14 percent of the time a disabled tanker would drift to shore in about 18 hours from 15 miles out, but this figure would drop to less than 1 percent if vessels were 40 miles or further from shore (Texaco 1989). The Service is currently attempting to model oil spill movement through the range of the southern sea otter as a function of spill time and distance from shore.

It is clear that depending on the size, location, and a variety of other factors, an accidental oil spill could have very serious adverse effects on the environment, and could result in injury or death to a significant proportion of the southern sea otter population as well as large numbers of other species (U.S. Fish and Wildlife Service 1993). It is therefore of great interest to the Service, where and how far offshore tanker traffic will occur.

Marbled Murrelet

The marbled murrelet is a small seabird of the family Alcidae that feeds in marine waters and nests onshore in old growth forests. The population segment that inhabits coastal Washington, Oregon, and California is listed as a threatened species (57 FR 45328). According to the Marbled Murrelet Recovery Team (U.S. Fish and Wildlife Service 1994), marbled murrelet populations appear to be declining rapidly in California, Oregon, and Washington. They estimate the three-state population to currently number between 13,000 and 20,000 birds, with 5,000 to 8,000 birds in California; 3,000 to 5,000 birds in Oregon; and 5,000 to 6,000 birds in Washington. Censuses of juvenile birds indicate that recruitment rates are extremely low throughout the range. Although currently under review, population models using the ratio of juveniles to adults to derive reproductive parameters indicate the populations are declining between 4 percent and 12 percent annually. These rates of decline suggest that in 20 years the marbled murrelet population in the three-state area could be reduced to less than one-half to one-twelfth of its current size (U.S. Fish and Wildlife Service 1994).

Marbled murrelets have a high susceptibility to mortality from oil spills because they tend to spend most of their time swimming on the sea surface and feeding in local concentrations close to shore. Depending on the location, extent, and season of an oil spill, significant adverse effects could occur to local or regional populations of marbled murrelets. Local populations were adversely affected by the Exxon Valdez oil spill of 1989, and marbled murrelets were subjected to proportionately higher mortality than other seabirds inhabiting Prince William Sound (Piatt et al. 1990).

Marbled murrelets are found both during the nesting season and during winter within areas affected by oil shipments. Of the three-state area inhabited by the threatened population segment, the Puget Sound area is of particular concern. Oiled marbled murrelets have been reported from previous oil spills in Washington (Leschner and Cummins 1990). Because the populations in Oregon,

Washington, and California are small and locally concentrated, oil spills could result in local extirpations.

Critical habitat has been proposed for marbled murrelets (Federal Register, Vol. 59, no. 18, January 27, 1994, pgs. 3811-3824). The January 27, 1994, proposal delineates only terrestrial habitat; however, a revision to the critical habitat proposal to include portions of the marine environment in Puget Sound and along the Washington, Oregon, and California coasts is being considered.

Reasonable Likelihood Determination

Under the regulations governing incremental step consultations, an agency action cannot proceed until the Service determines there is a reasonable likelihood that the entire action could proceed without violation to section 7(a)(2) of the Act (50 CFR 402.14(k)(5)). For the development, production, and transportation phases, this determination is founded on assumption-based scenarios, and our current understanding of natural conditions, both of which are subject to change prior to initiation of development and production. A thorough evaluation of impacts from development and production is not possible because any analysis would be speculative without a more definitive development scenario.

Given our current knowledge and level of concern for marbled murrelets and southern sea otters, however, the Service cannot at this time be reasonably certain that the entire action associated with Lease Sale 149, i.e., the transportation of oil to ports along the Pacific Coast, could likely proceed without violation of section 7(a)(2) of the Act. Before the Service can render a favorable reasonable likelihood determination, several issues must be addressed regarding oil transportation within Puget Sound, and along the Pacific coast of Washington, Oregon, and California (including San Francisco Bay). In order to adequately address these issues we recommend that the U.S. Coast Guard be involved with MMS in further consultation regarding oil transportation in U.S. waters south of the Canadian border. We suggest that those discussions center around the issue of reducing the potential for oil spills in the vicinity of listed species.

Four suggestions for reducing oil spill potential are:

1. Ensure that tankers are routed outside of waters which are inshore of the 1 percent probability contour for the spring season (mapped in detail by Ecological Consulting, Inc. 1990, or more recent mapping effort).
2. Establish monitoring and guidance systems at all ports to assist vessels entering ports, and other constricted waters, to avoid collisions.
3. Establish sufficient precautions which would decrease the potential for transport of petroleum products to result in the extirpation of local marbled murrelet populations.

Other solutions may exist; further discussion is needed to determine the most appropriate methods for reducing oil spill potential. Please contact Cynthia Barry, Ecological Services, Region 1, Portland, Oregon at (503) 231-6241, and Brian Anderson, Ecological Services, Region 7, Anchorage, Alaska at (907) 271- 2777 to schedule further discussion regarding the Service's "Reasonable Likelihood Determination" for the development and production phases of the project.

Conservation Recommendations

In the event that discussions among the Service, MMS, and the U.S. Coast Guard are successful in adequately reducing the potential for oil spills and the project proceeds, the Service believes that the following conservation recommendations may benefit listed species within the action area. 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.

1. The U.S. Coast Guard should pursue designation of a coastal route that remains seaward of virtually the entire 1 percent probability contour for the spring season (mapped by Ecological Consulting, Inc. 1990) as the preferred traffic separation scheme (TSS). It is recommended that the southern entrance to the San Francisco Bay Port Access route be restricted by the U.S. Coast Guard while extending the western entrance to accommodate this coastal route change. This coastal route should be charted on the appropriate navigational charts utilized by vessel operators, and these changes should be presented to the International Maritime Organization (IMO) so that this proposal may be adopted or amended by IMO for international use.
2. There have been many recent reports which suggest that an important step that could be taken to prevent and/or minimize impacts from an oil spill is to require that oil carriers (marine tankers, bulk oil carriers, and barges) have double bottoms or double hulls. The MMS should encourage implementation of the Oil Pollution Act of 1990 regarding double bottoms and double hulls on foreign and domestic commercial vessels (including barges) carrying petroleum as cargo off the coasts of California, Oregon, and Washington.
3. Vessel Traffic Service (VTS) systems may help guard against tanker grounding and collisions by determining the position of vessels through such means as radar surveillance and vessel radio reports. The MMS should cooperate with the U.S. Coast Guard in studying the benefits of creating a VTS system for the Santa Barbara Channel and Los Angeles/Long Beach Harbor. In the event that a VTS system is found to significantly reduce the risk of an accidental oil spill, the U.S. Coast Guard should seek approval and funding for installing a VTS system in the Channel. Participation in the VTS system should be required for all commercial vessels.

4. The U.S. Coast Guard should require that emergency response vessels be stationed in Monterey Bay capable of towing very large oil tankers and effectively operating in the open ocean.
5. The U.S. Coast Guard should seek requirements for all vessels transporting natural gas and crude oil to have redundant operational safety equipment, e.g., power and propellers, steering capability, radar, radio, direction-finding equipment, etc.
6. The U.S. Coast Guard should seek approval for vessels involved in lightering operations or entering marine terminals, bays, channels or other areas where movement is restricted or limited, or where traffic is increased, to be strictly regulated by a U.S. Coast Guard approved port access operation and safety plan, be assisted by a support tug, and be tended by an individual trained specifically in access to that port, terminal, or lightering operation.

The Alaska Region retains the Service's lead on this consultation; I will appreciate being kept apprised of any further developments. Please send your comments on this draft biological opinion to Ann Rappoport or Brian Anderson, Ecological Services Anchorage field office at (907) 271-2787 or (907) 271-2777, respectively. Do not hesitate to contact Ms. Rappoport or Mr. Anderson if you have questions regarding this draft biological opinion or are in need of further assistance.

cc: Regional Director, Region 1

A handwritten signature in cursive script, reading "Dan B. Allen". The signature is written in dark ink and is positioned to the right of the typed text.

LITERATURE CITED

- Anderson, B.L., M. Blenden, and R. Lowe. 1993. Breeding pair survey for Aleutian Canada geese nesting in the Semidi Islands - June 1992. Unpubl. U.S. Fish and Wildlife Service rpt. Anchorage, Alaska.
- Dahl, A.L., H.C. Stabins, C.E. Grue, and D.A. Manuwal. 1994. Aleutian Canada goose project: migration and wintering areas in California and Oregon, October 15, 1992, to April 21, 1993. Unpubl. rpt. prep. for U.S. Fish and Wildlife Service. Anchorage, Alaska. 40 pp.
- Day, R.H., D.H.S. Wehle, and F.C. Coleman. 1985. Ingestion of plastic pollutants by marine birds. In R. S. Shomura and H. O. Yoshida (editors), Proc. of the workshop on the fate and impact of marine debris, 26-29 November 1984, Honolulu, Hawaii. NOAA Tech. Memo. NMFS, NOAA-TM-NMFS-SWFC-54.
- Ecological Consulting, Inc. 1990. Seasonal and annual trajectory analysis of simulated oil outflow from vessel routes offshore of the California sea otter range.
- Harding Lawson Associates. 1990. Exploration plan, West Maktar Prospect, Beaufort Sea, Alaska. Rpt. prep. for Chevron U.S.A. Inc., San Ramon, California.
- Hasegawa, H. and A. DeGange. 1982. The short-tailed albatross, *Diomedea albatrus*, its status, distribution, and natural history. American Birds, vol. 36, no. 5, pp. 806-814.
- Leschner, L.L. and E.B. Cummins. 1990. The breeding status of the marbled murrelet in Washington (draft report). In: Proceedings of the marbled murrelet Workshop, Pacific Seabird Group, Pacific Grove, California. 15 pp.
- Piatt, J.F., C.J. Lensink, W. Butler, M. Kendziorek, and D.R. Nysewander. 1990. Immediate impact of the "Exxon Valdez" oil spill on marine birds. Auk 107:387-397.
- Robards, M.D., J.F. Piatt, and K.D. Wohl. 1991. Temporal and geographic variation in plastic particle ingestion by seabirds in Alaska, 1969-1990. Unpubl. rpt. U.S. Fish and Wildlife Service, Anchorage, Alaska.
- S.L. Ross Environmental Research LTD. 1990. Evaluation of capabilities to respond to large oil spills in California marine waters. Prep. for: California State Interagency Oil Spill Committee.
- Texaco. 1989. Tanker offshore distance versus probability of spill reaching Sea Otter range; enclosure (1) to evaluation of the ability of industry groups and government Agencies to contain and clean-up oil spills in the Sea Otter range with available resources. Texaco Trading and Transportation Inc. and the Gaviota Terminal Company (1989).

Townsend Environmental. 1990. Shipping safety and America's coasts.
Prep. for: Center for Marine Conservation. Washington D.C.

U.S. Fish and Wildlife Service. 1987. Final environmental impact statement,
translocation of southern sea otters. U.S. Fish and Wildlife Service,
Portland, Oregon.

U.S. Fish and Wildlife Service. 1992. Determination of threatened status for
the Washington, Oregon, and California population of the marbled
murrelet. Federal Register 57(191):45328-45337.

U.S. Fish and Wildlife Service. 1993. Memorandum: Regional Director,
Region 1, Portland, Oregon, to Regional Director, Region 7, Anchorage,
Alaska.

U.S. Fish and Wildlife Service. 1994. Memorandum: Marbled Murrelet Recovery
Team to Regional Director, Region 1, Portland, Oregon