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Environmental Assessment

Proposed Geophysical Survey Cosmopolitan Unit, Cook Inlet

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I. OBJECTIVES OF THE ENVIRONMENTAL ASSESSMENT

The Minerals Management Service (MMS) prepared this Environmental Assessment (EA) to determine whether or not a proposed geophysical (seismic) survey would cause significant effects. It examines the potential environmental effects of the Proposed Action and alternatives.

II. PURPOSE AND NEED FOR THE PROPOSAL

The purpose of the Proposed Action is to collect geophysical information for use in evaluating the potential for hydrocarbon accumulations and making decisions related to possible exploration drilling. These activities are authorized under the Outer Continental Shelf (OCS) Lands Act, and are regulated under 30 CFR 251. The MMS is mandated to preserve, protect, and develop oil and natural gas resources in the OCS in a manner which is consistent with the need (a) to make such resources available to meet the Nation's energy needs as rapidly as possible, and (b) to balance orderly energy resource development with protection of the human, marine, and coastal environments.

III. PROPOSED ACTION AND ALTERNATIVES

The Proposed Action is a three-dimensional (3-D) seismic survey of the Cosmopolitan Unit (which incorporates OCS leases OCS-Y-01664 and 01665) in southeast Cook Inlet between September 5 and November 15, 2005. The survey would extend about six miles to the northwest of Anchor Point, covering about 30 square miles of OCS water (Fig. 1). The inshore edge of the survey area would extend through the adjacent Alaska State water to shore, but the effects of the State portion of the survey would be assessed separately by the State. The water depth in the Federal portion would range from approximately 30 to 40 meters (m) (90 to 130 feet); the 25-fathom isobath (46-m isobath) is located approximately a mile seaward of the proposed survey area. The survey would be conducted with three vessels, one of which would tow cables with hydrophones and two four-airgun arrays. Each airgun would range in size from 1,500 to 2,500 cubic inches (in^3), and the hydrophones cables would be approximately 1,700-m in length. Data-collection transits would be conducted during only slack tides, when lateral deflection of the hydrophone cables would be minimal. The full airgun array would be activated only during data-collection transits through the survey area. To complete the 3-D survey of the area, two of the vessels would transit through the Federal portion of the survey area about 80 times during the survey period.

The Cosmopolitan Unit encompasses leases in both State and Federal waters. The applicant also has applied to the State of Alaska for permission to survey the portion of the Unit in State waters. The MMS Geological and Geophysical (G&G) permit would authorize only survey activities in Federal OCS waters. This EA evaluates the potential effects of the OCS survey on resources on both Federal and State waters.

The survey would be conducted by Veritas on behalf of ConocoPhillips. Veritas recently acquired Fairweather Geophysical, a company that has conducted similar seismic surveys in Cook Inlet over the past 15 years.

A. Standard MMS Mitigation

The MMS would require Veritas to comply with standard MMS stipulations (Appendix 1). The stipulations include the following special provision:

> Operations shall be conducted in a manner to assure that they will not cause pollution, cause undue harm to aquatic life, create hazardous or unsafe conditions or unreasonably interfere with other uses of the area. Any difficulty encountered with other users of the area or any conditions which cause undue harm to aquatic life, pollution, or could create a hazardous or unsafe condition as a result of the operations shall be reported without delay.

Additional MMS guidelines for operations near endangered whales would be provided to the permittee. These guidelines are posted at (www.mms.gov/alaska/re/permits/stips1-5.htm). The guidelines provide basic information to the permittee about the Endangered Species Act (ESA) of 1973, as it might apply to the proposed survey operations. The document includes the following specific guidelines to help avoid potential harassment of endangered whales:

> Vessels and aircraft should avoid concentrations or groups of whales. Operators should, at all times, conduct their activities at a maximum distance from such concentrations of whales.
>
> When a vessel is operated near a concentration of whales, the operator must take every precaution to avoid harassment of these animals. Therefore, vessels should reduce speed when within 300 yards of whales and those vessels capable of steering around such groups should do so. Vessels may not be operated in such a way as to separate members of a group of whales from other members of the group.

Vessel operators should avoid multiple changes in direction and speed when within 300 yards of whales.

When any Permittee becomes aware of the potentially harassing effects of operations on endangered whales, or when any Permittee is unsure of the best course of action to avoid harassment of endangered whales, every measure to avoid further harassment should be taken until the National Marine Fisheries Service is consulted for instructions or directions.

B. Mitigation That Is Part of the Proposal

Aside from the above mitigation measures, the National Marine Fisheries Service (NMFS) has recommended mitigation (Appendix II) to reduce potential impacts to marine mammals. Their letter of July 6, 2005, states that NMFS normally considers the threshold for noise harassment of marine mammals to be 160 decibels (dB) re 1 micro pascal. The letter recommended the following measures, which MMS will require as mitigation measures.

- Veritas must validate radius of the 160-dB zone *in situ* prior to the survey.
- Veritas must be able to effectively monitor the 160-dB zone.
- NMFS-approved monitors shall be on board the source vessel during surveys, and will observe for the presence of marine mammals. Observers will instruct the vessel operators to immediately stop or de-energize the array whenever a marine mammal is seen within the 160 dB re: 1 micro pascal isopleth, or is likely to enter that zone. The area shall be monitored to ensure marine mammals are not present for at least 30 minutes before resuming survey work.
- The array should be sequentially energized (ramp up) at the start of surveys by firing the smaller guns first, then adding additional guns to gradually reach full output.
- If the array is powered down for any reason during nighttime or poor sighting conditions, it may not be re-energized until daylight or whenever sighting conditions allow for the exclusion zone to be effectively monitored from the source vessel.
- Any shut down due to marine mammals within the safety zone, and any injury to a marine mammal, must be immediately reported to the NMFS Anchorage office (907) 271-3023 (Brad Smith).

The NMFS originally recommended that the array should be shut down during tide-cycle delays. This mitigation was discussed during telephone and email communications between MMS and NMFS staff July 18 and July 19, 2005 (Appendix II). If the array were to be shut down during tide-cycle changes, the other NMFS recommendations would prevent reactivation of the airgun array during nighttime tide-cycle changes. About one-half of the slack tides would be missed. Based on this communication, MMS and NMFS agreed on a modified measure that would allow data collection on each slack tide, and allow the survey to be completed timely:

- One gun will be kept firing during tide-cycle changes, if no marine mammals are within the 160-dB zone.

Although the NMFS made no recommendations for change in operations if the NMFS-approved observers sight a marine mammal beyond the 160-dB zone, MMS will require the permittee to shut-down the airgun array if a cetacean (e.g., a whale) or ESA-listed species is sighted by the NMFS-approved observers beyond the 160-dB zone.

The analyses for the proposed action (Alternative I) assume that the above mitigation measures are attached as conditions of permit approval.

C. Alternative to the Proposed Action

Alternative II - No Survey. Under this alternative, MMS would not approve the G&G permit application.

D. Alternative Considered But Not Analyzed

Delay of the survey was considered as an alternative to the proposed action. Short-term delay of the survey would introduce additional operational problems related to deteriorating weather and shorter daylight hours. After November 15, Steller's eiders would be present in greater numbers, posing greater potential impacts to threatened species. Therefore, short-term delay is not considered a viable option. Longer delay is not an option because of MMS and State requirements to perform exploration work on the leases before the end of the primary lease term, which is coming up soon, and the leases expire.

IV. IMPACT ANALYSIS

This document is tiered from previous assessments of seismic surveys in Cook Inlet. The Cook Inlet multiple-sale Final EIS (USDOI, MMS, 2003) provides a recent summary of the animals and fishing activities in the proposed survey region during the autumn; specifically, birds and marine mammals covered under the ESA, other marine and coastal birds, other marine mammals, fishes, and fishing. This document is tiered also on CER 93-05, which assessed the effects of a lower Cook Inlet survey with a 3,000 in^3 airgun.

A. Threatened and Endangered Species

Species that are listed as either threatened or endangered under the ESA, proposed for listing, currently listed as candidates for listing, designated as Species of Concern by NMFS, and recently removed from the list of species protected under the ESA occur in or adjacent to the proposed seismic survey area.

Under Section 3 of the ESA (16 U.S.C. 1531-1544), as amended, an "endangered species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range…" and a "threatened species" is "…any species which is likely to become endangered within the foreseeable future throughout all or a significant part of its range."

Section 3(15) of the ESA, as amended, states: "(T)he term "species" includes any subspecies of fish or wildlife or plants, and any distinct population segment of any vertebrate fish or wildlife which interbreeds when mature" (16 U.S.C. § 1532). Thus, under the ESA, distinct population segments and subspecies are included along with biological species in the definition of "species," and such entities can be listed separately from other subspecies and/or distinct population segments of the same biological species. In many cases, one or more, but not all, subspecies or designated distinct population segments (e.g., the Southwest Alaska Distinct Population Segment of the northern sea otter) of a biological species will be given, or considered for, protected status under the ESA, but other population segments of the biological species will not (e.g., the Southcentral Alaska stock of sea otters). Different distinct population segments of the same biological species also can have different status under the ESA (e.g., the western and the eastern U.S. population stocks of Steller sea lions).

A.1 Threatened and Endangered Birds

A majority of the threatened status Steller's eiders, a bottom-foraging diving duck, remain in molting areas along the north side of the Alaska Peninsula until at least November (Jones, 1965; Laubhan and Metzner, 1999; Ward and Stehn, 1989). They then move to overwintering areas in the Aleutian Islands, south side of the Alaska Peninsula, Kodiak Archipelago, and Cook Inlet. Petrula and Rosenberg (2002) have observed tens to hundreds of Steller's eiders south and east of Anchor Point in winter. During aerial surveys in January 2004, an estimated 897 were observed on the east side of Lower Cook Inlet, 678 between Anchor Point and Ninilchik, and 219 between Homer and Anchor Point (Larned, 2004). It is likely that approximately 4% of these individuals (36) were from the listed U.S. population, with the remainder belonging to the Russian population. All individuals observed were located less than 3 miles (mi) offshore in waters under the jurisdiction of the State of Alaska, and the largest concentrations were within 1 mi of shoreline (Larned, pers. commun., 2005). In summary, the eiders probably would arrive in the survey area after the period of operation and would be concentrated inshore of the Federal waters.

The Kittlitz's murrelet, a diving seabird, was designated a candidate for ESA listing in May 2004 (69 *FR* 24877). Highest summer densities of Kittlitz's murrelets in Cook Inlet are observed in the Anchor Point area, but its annual distribution generally is not well documented. For example, its distribution between known or suspected breeding areas, such as from the lower Kenai Peninsula to Cape Ninilchik (Kuletz and Piatt, 1992), and areas where sightings have been made during the winter season, such as Kachemak Bay (Day, Kuletz, and Nigro, 1999), is unknown. Agler et al. (1995) recorded sufficiently high numbers of murrelets in winter surveys of lower Cook Inlet to suggest an estimated 11,627 murrelets were present, mostly in Kachemak Bay. While the researchers did not distinguish between the two very similar murrelet species that occur in the inlet, it is likely that some proportion of these were Kittlitz's. Also, although Kendall and Agler (1998) reported no Kittlitz's in eastern Lower Cook Inlet in winter, they note that some proportion of unidentified murrelets observed during their surveys could have been this species. Given the typically clumped distribution of this species and probably small Cook Inlet population, randomly selected sample transects easily could miss a majority of individuals during a survey; therefore, surveys to date may not accurately portray its distribution and abundance in this area.

Potential effects of the proposed seismic survey on birds in lower Cook Inlet include displacement from foraging or resting areas due to disturbance from vessel presence, collisions with seismic vessels under conditions of reduced visibility, and adverse physiological or behavioral changes to or displacement of diving species from seismic energy impulses. Displacements resulting from response to vessel movements are expected to be relatively short term in any given section of the proposed survey area, particularly if the seismic lines are shot in sequence across its width, so a specific section will be transited only once. Some maneuvering by vessels to line up for the next shot line prior to the next slack tide, when operations resume, would result in additional vessel movements. However, displacements resulting from such vessel movements are not likely to interfere significantly with the physiological condition of the individuals in Federal waters at this time of year. Any collision of birds with the vessels is likely to result in mortality. The vessels will be operating at a time of year when day length and, thus, vessel visibility are decreasing rapidly. However, the vessels are likely to remain in a given area for relatively short periods, suggesting that a given species' population segment in that area will experience a minimal exposure to this hazard. Also, birds that spend much of the day foraging and resting rather than flying, and do not fly frequently at night, are not likely to collide with the vessels. It is not known at this point whether lighting on the vessels during darkness will attract birds, representing a hazard, or simply indicate an object to be avoided. No bird species is known to be affected significantly by high-energy impulses produced by seismic airguns. For example, Lacroix et al. (2003) examined the potential effect of underwater seismic activity on movements and diving behavior of long-tailed ducks molting in Beaufort Sea lagoons. These investigators found no effect of seismic activity on the behavior of this diving duck species, although several factors limited their ability to detect subtle disturbance effects. Potential physiological effects of seismic impulses are unknown.

In summary, Steller's eiders typically occur in the nearshore portion of the proposed survey area beginning in November and could experience any of these effects, if the survey extended into this time period. However, because of their nearshore distribution, any local/short-term displacements, collision mortality, or potential effects of underwater seismic impulses is likely to occur in State of Alaska rather than Federal waters. Kittlitz's murrelets probably are uncommon to rare in the proposed survey area; a very small proportion of the population potentially would be exposed to the survey effects described above, and a small proportion of these would be from the proposed candidate Alaskan population. Thus, the proposed seismic survey is unlikely to affect ESA-covered bird species.

A.2. Threatened and Endangered Marine Mammals

There are four ESA "species" of marine mammals, (two of which belong to the same biological species) that are listed as either threatened or endangered under the ESA and that have been documented as occurring during some season of the year within or adjacent to the proposed survey area (USDOI, MMS, 2003; NMFS, 2003; NMFS, 2005a:para. 2). Additionally, there is one species that is listed as a "Species of Concern" and has been recommended for review for potential ESA listing.

- Fin whale - Endangered
- Humpback whale - Endangered
- Steller sea lion (Western U.S. Stock) - Endangered
- Steller sea lion (Eastern U.S. Stock) - Threatened
- Beluga whale (Cook Inlet stock) - Species of Concern (ESA); ESA status review recommended

There is no designated critical habitat within the proposed seismic survey area. The nearest designated critical habitat [for Steller sea lions] is located at the southwestern portions of Kachemak Bay (near to and west of Seldovia) (USDOI, MMS, 2003:Map 13). Evidence does not indicate this critical habitat is likely to be negatively impacted by the proposed action. Sea otters from the Southcentral Alaska stock also occur in this area. However, based on Fish and Wildlife Service's (FWS's) categorization, the designated Distinct Population Segment (DPS) of sea otters from the Southwest Alaska population stock of sea otters currently proposed for listing under the ESA are not expected to occur on the eastern side of Cook Inlet near where the proposed seismic survey would occur. We refer readers to following FWS website for a map depicting the boundaries of the designated stocks: http://alaska.fws.gov/media/seaotter2004/stockmap.jpg. Thus, we considered the effects to sea otters in the nonendangered marine mammals section. Below, we also briefly summarize information about the distribution of ESA-listed marine mammals that we conclude do not typically occur in areas where it could reasonably be concluded that they might be exposed to these seismic surveys. We do so to make the basis for our conclusion transparent.

We provide detailed information that is beyond the scope of this document on these species in the Final EIS for Cook Inlet OCS Oil and Gas Lease Sales 191 and 199 (USDOI, MMS, 2003). We have recently reviewed and incorporated new information about these species in our draft affected environment sections for the EIS for MMS's next (2007-2012) 5-year leasing program. We incorporate the information in the aforementioned documents by reference. We also have reviewed the 2003 Biological Opinion from FWS to the U.S. Army Corps of Engineers related to this project and NMFS's letter of July 6, 2005 (NMFS, 2005a), to MMS related to this proposed survey. We have considered all of this information in our evaluation of the potential impacts of the proposed action. We summarize information about these species below that is necessary for evaluating potential impacts from the proposed seismic survey.

A.2.a Beluga Whale (Cook Inlet Stock) (*Delphinapterus leucas)* – Species of Concern

Cook Inlet beluga whales are a depleted stock of cetacean that could potentially occur in waters within or adjacent to the proposed seismic survey area. However, given what is currently known about their current abundance and habitat use patterns (see below), their occurrence in the proposed survey area is not likely. For details beyond those practical in the current document, we refer readers to the following: the recently revised stock assessment (Angliss and Lodge, 2005); the Draft Conservation Plan for the Cook Inlet Beluga Whale (*Delphinapterus leucas*) (NMFS, 2005b; testimony provided (Brix, 2004; Calcote, 2004; Goodman, 2004a; Hobbs, 2004; Punt, 2004), and responses to testimony (Goodman, 2004b; Starkey, 2004), for the Hearing with Administrative Law Judge and Parties in July 2004 (available at http://www.fakr.noaa.gov/protectedresources/whales/beluga.htm); 2004 Subsistence Harvest Plan for Cook Inlet Beluga Whales (NMFS, 2004a); the July 2003 Final EIS – Subsistence Harvest Management of Cook Inlet Beluga Whales (NMFS, 2003a); Cook Inlet multiple-sale final EIS (USDOI, MMS, 2003); the Recommended Decision by the U.S. Administrative Law Judge (Administrative Law Judge, 2002) on the proposed rule limiting the subsistence harvest of Cook Inlet belugas; Volume 62(3) of *Marine Fisheries Review;* and the Status review in the June 22, 2000, *Federal Register* (65 *FR* 34590). We have reviewed and considered this and other information in our evaluation of the potential effects of our proposed action. We provide considerable, but summarized, information on this population for several reasons. At least some, and possibly most, members of the population currently occur in the inlet year-round. Additionally, the population is currently very small and, thus, the potential impact of any adverse effect is relatively great compared to more numerous species. Belugas are an important subsistence species for Alaskan Natives in the Inlet.

A.2.a(1) Status

Cook Inlet beluga whales are genetically differentiated from other beluga populations, and it is likely there is little or no interchange of this population with other beluga populations (O'Corry-Crowe et al., 1997). They are designated as a separate population stock, and as depleted, under the MMPA (64 *FR* 56298). Cook Inlet belugas are considered a distinct population (Hazard, 1988; Hill and DeMaster, 1998) segment and, therefore, a species" as defined "under section 3(15) of the Endangered Species Act" (65 *FR* 38778). The stock was previously designated as a Candidate species under the ESA (65 *FR* 38778) but was removed (69 *FR* 19975) from the list of candidate species in April 2004 and placed on the newly established Species of Concern List. The NMFS (2005b) recently released a Draft Conservation Plan that recommends initiation of ESA status review of this stock.

Estimates indicate that population size may have declined by about 47% between 1994 (n = 653) and 1998 (n = 347) (Hobbs, Rugh, and DeMaster, 2000; NMFS, 2005b) due primarily to a high (Mahoney and Shelden, 2000; NMFS, 2005b) and unsustainable take by Alaskan Native hunters. The NMFS has promulgated regulations for the taking of Cook Inlet beluga whales by Alaskan Natives for the years 2001-2004 (69 *FR* 17973). The NMFS has entered into several cooperative agreements with the Cook Inlet Marine Mammal Council (Brix, 2004) that specify conditions, time periods, locations, and other aspects of the permitted subsistence hunt of Cook Inlet beluga whales. Brix (2004) reported that hunters have agreed to a harvest of 1.5 whales/year for the period 2005-2009, a level NMFS has determined will not unduly delay recovery. Goodman (2004b) stated:

> …any removals from a depleted stock that is declining or not growing will negatively impact the stock and will make recovery less likely…. I do not believe the NMFS proposal can be appropriately characterized as being 'scientifically sound,' inasmuch as it relies on an assumed population growth potential of…2 and 6 percent, when the empirical evidence…indicate a higher likelihood that the population has a growth potential lower than 2 percent….

The NMFS (2005b) now believes that factors in addition to subsistence harvest may have potential to impact this stock. The NMFS (2005b) Draft Conservation Plan contains a proposed conservation strategy toward the goal of recovering this population to no fewer than 780 whales. Their analyses indicate recovery to this point "…will require at least 30 years under the most optimal conditions."

A.2.a(2) Use of Cook Inlet, Including Areas within or Near the Seismic Survey Area

We confine our discussion to information relevant to assessing whether belugas can and are likely to occur in areas that could be affected by the proposed seismic survey and, if so, when they would be likely to or could occur.

Available information indicates that at least some members of this population tend to stay much or all of the year in Cook Inlet (NMFS, 2005b and references cited therein). The known summer distribution of this population apparently has shrunk since the mid-1970's (Rugh, Shelden, and Mahoney, 2000). Belugas also can occur within lower Cook Inlet. However, Rugh, Shelden, and Mahoney (2000:6) concluded: "Over the past three decades, summer distribution has shrunk such that sightings now only rarely occur in lower Cook Inlet and in offshore areas." At present, 96-100% of the sightings reported are concentrated in a few dense groups in a shallow area in upper Cook Inlet near river mouths (Rugh, Shelden, and Mahoney, 2000). None of the seven groups observed in lower Cook Inlet were large (1-14 whales each) (Rugh, Shelden, and Mahoney, 2000).

Moore et al. (2000a:Fig. 1) used summer distribution patterns, as ascertained from the surveys conducted by Rugh, Shelden, and Mahoney (2000), to summarize Cook Inlet beluga habitat preferences into three regions termed areas of high (Region 1), moderate (Region 2), and low (Region 3) beluga occurrence. At present, documented zones of high summer use include areas in or near the Susitna Delta, Knik Arm, and Point Possession in the extreme upper inlet. In winter, belugas are seen in the central inlet, but whales are more dispersed than in the summer and sightings are fewer. The strongest influence on the distribution and relative abundance of belugas in Cook Inlet probably is prey availability (Moore et al., 2000a). The NMFS (2005b) also concluded that beluga concentration areas correspond with prey availability. In summer, the belugas congregate in shallow, relatively low salinity and warm areas near river mouths in upper Cook Inlet. The NMFS (2005b) stated: "Belugas concentrate at river mouths and tidal flat areas, moving in and out with the tides from April through November. The timing and location of eulachon and salmon runs affect beluga whale feeding behavior…." Beluga hunters report that beluga whales have been seen north of Kenai in March feeding on Pacific herring (*Clupea pallasi*) (Huntington, 2000), and that they come up the Kenai River area from April-November after fish.

Belugas disperse throughout much of the upper Inlet by the end of June (NMFS, 2000). Dispersal of large groups is not observed until later in the summer Moore et al. (2000a). By mid- to late October, belugas travel south from the upper inlet, but sightings near Anchorage continue into November (NMFS, 2000). There are a few sightings of belugas in the central Inlet in winter. Of 17 whales instrumented with satellite transmitters, none moved south of Chinitna Bay, including 10 whose transmitters were broadcasting through the fall and 3 whose transmitters broadcast though the winter (Angliss and Lodge, 2005).. Based on aerial surveys of upper Cook Inlet flown almost monthly between June 2001 and June 2002, Rugh et al. (2004) found that aerial counts stayed high from June thru October, dropped from November to April and rose again the following June. They observed belugas in the upper inlet in nearly every month of the year except February. These data "…suggest…some whales inhabit this area year-round, although their distribution may be more offshore in winter than in summer" (Rugh et al, 2004:12). Rugh et al. (2004:13) concluded it is not yet clear what proportion of the population remains in the upper inlet and cautioned that the "drop in sightings in winter is not considered evidence that these whales leave the area. The highest median counts of belugas in all of the lower inlet (all of the inlet south of the East and West Forelands) during aerial surveys in June or July 1993-2004 indicate there are very few belugas in this region during these months, especially in recent years (1993:1; 1994:10; 1995:14; 1996:0; 1997:1; 1998: 0; 1999:0; 2000:0; 2001:2; 2002:0; 2003:0; 2004:0) (Rugh et al., 2005:36, Table 6). The NMFS (2005b:8) summarized that "the available information indicates that CI beluga whales remain in the mid and upper Inlet during the winter months, but their range extends throughout much of the Inlet. Their winter distribution does not appear to be associated with river mouths, as it is during the warmer months." Beluga whales have not been sighted in the lower Inlet during aerial surveys of Steller's eiders conducted in the winters of 2003-2004 and 2004-2005 (Larned, 2005, pers. commun.).

Prior to 1995, when the population was larger, belugas were observed in a variety of locations in the Inlet in the spring summer and fall seasons. This included frequent (NMFS, 2005b) sightings of beluga whales in Kachemak Bay, including animals remaining all summer, and more frequent use of the Kenai River (see NMFS, 2005b and USDOI, MMS, 2003 for more detailed summary). While use of these areas, or even areas within the proposed seismic survey area, may occur with greater frequency as the Cook Inlet beluga recovers (USDOI, MMS, 2003; NMFS, 2005b), sightings at present rarely are reported from lower Cook Inlet or from offshore areas.

The NMFS (2005b) stated that data from satellite tracking indicate belugas use streams on the west side of Cook Inlet from the Susitna River Delta south to Chinitna Bay during late summer and fall. The NMFS (2005b:Fig. 5) categorized habitat areas for Cook Inlet belugas into 4 types (1 being of highest value) depending on its value and the sensitivity of the habitat. Nearshore areas near the proposed seismic survey are currently considered as Type 3 (including winter habitat areas, secondary summering sites, and historic habitat sites), and offshore areas near the site are categorized as Type 4 habitat (denoting the remainder of the known range within Cook Inlet). Using NMFS' satellite tagging data, Figure 4a of NMFS (2005b:9) depicts current Cook Inlet beluga whale area use by month (August-November). Based on these data, belugas would not typically be expected to occur within 9 kilometers (km) of the seismic survey area during the period of the survey.

Cook Inlet belugas that were moving north to south along the eastern side of the Inlet in order to move into Kachemak Bay or out of the inlet could potentially be exposed to this noise or other potential adverse effectors associated with this seismic survey. With respect to winter habitat and/or other use of areas outside of the inlet, NMFS (2000:17) summarized that: "It is presently unknown whether this stock migrates seasonally from Cook Inlet and, if so, where it goes." It is unknown how many individuals currently travel to the lower Inlet (although if they are there, they are rarely observed); leave the Inlet altogether in most years; or what factors (for example, age, sex, reproductive status, ice conditions, etc.) may be associated with winter distribution patterns and the tendency for individuals to stay in or leave the Inlet. There are occasional sightings of belugas outside of Cook Inlet (see current and historical summary in Laidre et al., 2000; NMFS, 2005b).

There are fish runs in and near (in the offshore) the Anchor River and other streams in eastern lower Cook Inlet during the timeframe of the seismic survey that could potentially attract belugas and other fish-eating marine mammals into the area. For example, Szarzi and Begich (2004:29) summarized that:

> Four roadside tributaries of the" Lower Cook Inlet Management Area " support steelhead trout fisheries:…the Anchor River, Deep Creek, Stariski Creek and Ninilchik River, of which the Anchor River supports the largest fishery…Area steelhead stocks are exclusively defined as fall-run fish that enter fresh water from August to November....

A.2.a(3) Historical and Current Abundance

Available information indicates population abundance of beluga whales in Cook Inlet may have numbered about 1,300 but declined dramatically (NMFS, 2005b) in the 1990's, primarily due to high and unsustainable levels of take (see Figure 7 in NMFS, 2005b:28; Mahoney and Shelden, 2000) by Alaskan Native hunters (NMFS, as cited in Administrative Law Judge, 2002). However, there may be other factors significantly contributing to the decline (NMFS, D. DeMaster, J. Blatchford, D. Goodman, cited in Administrative Law Judge, 2002) (see additional information on the effects of continued subsistence harvest on population recovery in NMFS's July 2003 final EIS – Subsistence Harvest Management of Cook Inlet Beluga Whales and the 2004 Subsistence Harvest Management Plan for Cook Inlet Beluga Whales). The NMFS (2005b) identifies known and possible factors that could be influencing this population. Information about long-term abundance trends is not available because of the variety and lack of documentation in many of the previous surveys (Hobbs, Rugh, and DeMaster, 2000).

The NMFS (described in Rugh, Shelden, and Mahoney, 2000) conducted thorough annual surveys of the coastal regions of Cook Inlet (1,350 km [838.9 mi] of shoreline) (Moore and DeMaster, 2000) in June and/or July since 1993. Surveys also included about 1,000 km (~621 mi) of transects across the central inlet to provide coverage of an estimated 13-33% of the entire inlet (Rugh, Shelden, and Mahoney, 2000). Hobbs, Rugh, and DeMaster (2000) calculated abundances (see Table IV.A.2-1) of beluga whales in Cook Inlet for each year of these surveys. R. Hobbs of the National Marine Mammal Laboratory (NMML) (Hobbs, 2003, pers. commun.) cautions against over interpretation of these survey data. While the apparent change in estimated abundance between the summers of 1999 and 2000 was within the amount of change that could be expected, based on the confidence intervals for the estimates, it is clear that beluga populations are not capable of a real increase in abundance of nearly 19% over the time period of a single year. Currently, survey data cannot distinguish between a small increase, stasis, and a small decrease. Hobbs, Rugh, and DeMaster (2000) reported that Monte Carlo simulations indicated that there was a 47% probability that from June 1994 to June 1998, there was a 50% depletion of abundance of belugas whales in Cook Inlet (see detailed analyses in Hobbs, Rugh, and DeMaster, 2000). Moore and DeMaster (2000) calculated that the take represented 21% of the best estimate of abundance in 1998 (347, standard error = 101, coefficient of variation (CV) = 0.29) and was about five times the calculated (Hill and DeMaster,

1998) potential biological removal (PBR) of 14 animals for the population at that abundance. Data on the intrinsic rate of growth for Cook Inlet beluga whales is unknown (NMFS, as cited in Administrative Law Judge, 2002) as is the carrying capacity for the stock (NMFS and D. Goodman, as cited in Administrative Law Judge, 2002).

There is no evidence that the belugas in Cook Inlet have dispersed in response to the Native harvests (Laidre et al., 2000; Rugh, Shelden, and Mahoney, 2000). Estimates of abundance since harvest restrictions in 1999 have not shown significant growth. The population now is considered to be below its Optimal Sustainable Population. Goodman (2004a) pointed out that population size has been below 500 for nearly a decade. He summarized that small populations are at risk of social disruption and genetic deterioration and are more vulnerable to environmental perturbations. Goodman (2004a) noted that at such small size, the population may not be fully functioning in its usual role in its ecosystem. He concluded that apparently as yet unidentified factors are acting to depress growth or cause mortality.

A.2.a(4) Feeding Ecology and Prey

Information on feeding ecology and behavior is important in evaluating potential effects of the proposed action, because it provides insight into whether the species is likely to be in the area when the seismic activity occurs and because it is needed to be able to evaluate indirect effects of the action. Belugas eat a wide variety of prey (NMFS, 2000; Moore et al., 2000a; Native hunters in Huntington, 2000). Reported prey species include capelin, cod, herring, smelt, flounder, sole, sculpin, lamprey, salmon, octopus, crabs, shrimp, clams, mussels, snails, squid, sandworms (Klinkhart, 1966; Haley, 1986; Perez, 1990), and eulachon (hooligan). The NMFS (2000) identified eulachon as "…a very important food source" and salmon smolt as an important spring prey item, for beluga whales in Cook Inlet. Belugas aggregate near areas where salmon runs are occurring and adult king and coho salmon have been found in harvested individuals. All five species of salmon occur in the range of this population. Native hunters reported that belugas also will eat the following species in the inlet and/or in rivers: lingcod or burbot (*Lota lota*), steelhead trout (*Oncorhynchus mykiss*), whitefish, northern pike (*Esox lucius*), Arctic grayling (*Thymallus arcticus*), starry flounder (*Platichthys stellatus*) (Huntington, 2000), and tomcod (Fall, Foster, and Stanek, 1984). Belugas are reported to feed intensively. In captivity, they may consume 40 to 60 pounds (~18-27 kilograms) of food daily or 2.5-3% of their body weight.

A.2.a(5) Reproductive Biology

There is little information on the current reproductive characteristics of beluga whales in Cook Inlet. Calving in Cook Inlet has been reported to occur from mid-May to mid-July (Calkins, 1983) and from April-August (Native hunters, as cited in Huntington, 2000). Native hunters reported that calving areas include the northern side of Kachemak Bay in April and May, areas off the mouths of the Susitna and Beluga rivers in May, and Chickaloon Bay and Turnagain Arm in the summer (see Huntington, 2000:Fig. 2). Breeding probably occurs shortly after calving. Based on this information, the proposed seismic activity is not expected to overlap in time with calving or breeding or to be likely to affect neonate belugas.

Age of sexual maturity likely is variable, with reports ranging from 4 to 7 years (Nowak, 1991) and 10 years (Suydam et al., 1999, as cited in NMFS, 2000) for females and 8 to 9 years (Nowak, 1991) and 8-9 years for males (Suydam et al., 1999, as cited in NMFS, 2000). The latter reports by Suydam are for beluga in the Chukchi Sea. The NMFS (65 *FR* 38778) summarized that "…there is some evidence that reproduction in the stock has not been compromised…."

A.2.a(6) Hearing and Vision

Beluga whales are toothed whales (odontocetes). They have acute hearing, which they use to find prey, navigate, and communicate. They echolocate. The beluga whale has a wide frequency range of hearing (Klishin, Popov, and Supin, 2000). Richardson et al. (1995a; see also Klishin, Popov, and Supin, 2000) reported that they can hear from about 40 to 75 Hertz (with poor sensitivity at these low frequencies) to 80 to 150 kilohertz in at least some individuals. The frequency tuning of the beluga is extremely acute, temporal resolution is rather high, and they have acute directional selectivity (Klishin, Popov, and Supin, 2000). The NMFS (2000) summarized that at low frequencies, the hearing of belugas is limited by their hearing threshold and not by ambient noise.

Beluga whales are reported to have acute vision and are believed to have color vision (Herman, 1980; NMFS, 2000).

A.2.a(7) Longevity and Nonhuman Related Sources of Mortality

Documented natural sources of mortality in Cook Inlet belugas include stranding (see detailed discussion and presentation of stranding data in NMFS, 2005a:e.g., page 21) and predation (NMFS, 2000). Little is known about other natural causes of death in these whales or typical survival rates. Burns and Seaman (1986) reported that beluga may live for 30 or more years.

Belugas commonly strand in upper Cook Inlet. Mass stranding often coincides with extreme tidal fluctuations and/or orca sightings and tend to be reported from Turnagain Arm (Shelden et al., 2003; NMFS, 2005b). Citing Moore et al. (2000a) Shelden et al. (2003) summarized that during strandings, beluga deaths appear to be rare. However, in August 2003, 5 of 46 stranded whales are known to have died. Four adults whales died during a mass stranding of about 60 whales in 1996, and 5 adult whales died during a mass stranding of about 70 whales in 1999 (NMFS, 2000). Stranding reports do not necessarily represent the actual number of occurrences, because sightings of strandings are opportunistic (Moore et al., 2000a).

The NMFS (65 *FR* 38778) summarized that neither disease nor predation is causing the Cook Inlet beluga stock to be threatened or endangered. NMFS (2005b:24) concluded, however, that the potential for a significant effect of killer whale predation exists, due to the small size of the beluga population.

Summary: We conclude that the area of the seismic survey is within the historic range of the Cook Inlet beluga whale. Their habitat use is closely tied to the availability of their prey. A run of steelhead trout from late August into November into streams in eastern Cook Inlet, including especially the Anchor River, could attract belugas to this area during the period of the survey. However, limited available data do not indicate they are likely to be present when the seismic survey is occurring.

A.2.b Blue Whale (*Balaenoptera musculus*) – Endangered

A.2.b(1) Basic Description

Blue whales are a baleen whale and the largest of all of the whales. Blue whales historically inhabited areas in the North Pacific south of the Aleutian Islands and in the Gulf of Alaska. There are rare sightings of blue whales in the Gulf of Alaska (GOA) (e.g., during recent SPLASH surveys [Barlow, 2004]). Additionally, acoustical evidence from the GOA indicates there are blue whales in the GOA at least seasonally, but the abundance or habitat use of these whales is unknown. Based on reported sighting data (USDOI, MMS, 2003:Map 12), they are not abundant. These data should not be interpreted to indicate abundance or as absolute indicators of whether a species occupies a particular area.

Available evidence indicates blue whales are present offshore in the South Alaska Subregion in the GOA seasonally (approximately July-December) in relatively low but unknown abundance. They are unlikely to inhabit Cook Inlet or nearshore shallow waters. While this species occurs in the GOA (see information summarized in USDOI, MMS, 2003), they tend to inhabit open ocean and are not know to inhabit areas near the proposed seismic area or within areas where sound from the proposed action could reasonably be expected to affect them.

A.2.c Fin Whale (*Balaenoptera physalus*) – Endangered

A.2.c(1) Summary and Basic Description

Fin whales are large, fast-swimming baleen whales (Reeves, Silber, and Payne, 1998). They are known to inhabit and feed in areas within the GOA, entrances from the GOA to Cook Inlet, and Shelikof Strait. By letter of July 6, 2005, NMFS (2005b) informed MMS that fin whales were among those species that may occur in waters of eastern lower Cook Inlet near the Cosmopolitan Unit and near to Anchor Point. The distribution and relative abundance of fin whales in these areas varies seasonally.

A.2.c(2) Population Structure and Current Stock Definitions

The NMFS (Angliss and Lodge, 2005) recognizes three population stocks of fin whales in U.S. Pacific waters: an Alaska or Northeast Pacific Stock, a California/Washington/Oregon Stock, and a Hawaii Stock, but currently consider stock structure in fin whales to be equivocal (Angliss and Lodge, 2005). As discussed more fully elsewhere (USDOI, MMS, 2003, Angliss and Lodge, 2005), investigators have reached different conclusions about the number and locations of population stocks in the North Pacific.

A.2.c(3) Current Status and Protective Legislation

Fin whales were listed as endangered under the ESA in 1973 (Perry, DeMaster, and Silber, 1999a) and as depleted under the Marine Mammal Protection Act (MMPA). Under the 1994 amendments to the MMPA, they are categorized as a strategic stock. The International Whaling Commission (IWC) prohibited their harvest in the North Pacific in 1976. In July 1998, NMFS released a joint Draft Recovery Plan for the Fin Whale *Balaenoptera physalus* and Sei Whale *Balaenoptera borealis* (Reeves, Silber, and Payne, 1998). No critical habitat has been designated or proposed for fin whales in the North Pacific.

A.2.c(4) Reproductive Biology

Mating and calving are believed to occur on wintering grounds (Perry, DeMaster, and Silber, 1999a). Because small calves have not been seen in the winter in areas near the seismic survey, it is unlikely calving occurs near to where the survey would occur (Mizroch et al., draft manuscript). A single calf is born after a gestation of about 12 months and weaned between 6 and 11 months of age (Best, 1966; Gambell, 1985).

A.2.c(5) Nonhuman Related Sources of Mortality

We summarize and discuss sources of human mortality and other impacts in the Cumulative Effects section. There is little information about natural causes of mortality (Perry, DeMaster, and Silber, 1999a). The NMFS summarized that: "There are no known habitat issues that are of particular concern for this stock" (Angliss and Lodge, 2002, 2005). Perry, DeMaster, and Silber (1999a:51) listed the possible influences of disease or predation as "Unknown."

A.2.c(6) Foraging Ecology and Feeding Areas

Nemoto and Kasuya (1965) reported that fin whales feed in shallow coastal areas and marginal seas in addition to the open ocean. Citing the IWC (1992), Perry, DeMaster, and Silber (1999a) reported that there is great variation in the predominant prey of fin whales in different geographical areas, depending on which preys are locally abundant. While they "depend to a large extent on the small euphausiids" (see also Flinn et al., 2002) "and other zooplankton" (Perry, 1999:49), reported fish prey species in the Northern Hemisphere include capelin, *Mallotus villosus*; herring *Clupea harengus*; anchovies, *Engraulis mordax*; sand lance, *Ammodytes* spp) (Perry, DeMaster, and Silber, 1999a); and also octopus, squid, and ragfish (Flinn et al., 2002). Stomach content data from the 1950's and 1960's, (Nemota and Kasuya, 1965) indicated that in the Gulf of Alaska, *Euphausia pacifica*, *Thysanoessa inermis*, *T. longipes*, and *T. spinifera* are the primary prey of fin whales. Mizroch et al. (draft manuscript) summarized fish, especially capelin, Alaska pollock, and herring are the main prey north of 58° N. latitude in the Bering Sea. Reeves, Silber, and Payne (1998) reported the above species as primary prey in the North Pacific and also listed large copepods (mainly *Calanus cristus*), herring, and walleye pollock (*Theragra chalcogramma*). Fin whales aggregate where prey densities are high (Piatt and Methven, 1992; Piatt et al., 1989; Moore et al., 1998; Moore et al., 2002). Often these are areas with high phytoplankton production and along ocean fronts (Moore et al., 1998). Such areas are, in turn, often associated with the continental shelf and slope and other underwater geologic features such as seamounts and submarine canyons (Steele, 1974; Boehlert and Genin, 1987; Dower, Freeland, and Juniper, 1992; Moore et al., 1998).

A.2.c(7) Current and Historic Abundance

Angliss and Lodge (2005) cite a revised, unpublished February 2003 version of IWC Bureau of International Whaling Statistics data, stating that "Between 1925 and 1975, 47,645 fin whales were reported killed throughout the North Pacific".

The NMFS has concluded that there is no reliable information about population abundance trends, and that reliable estimates of current or historical abundance are not available, for the entire Northeast Pacific fin whale stock (Angliss and Lodge, 2002, 2005; Reeves et al., 1991). During visual cetacean surveys in July and August 1999 in the central Bering Sea, and in June and July 2000 in the southeastern Bering Sea, fin whale abundance estimates were almost five times higher in the central Bering Sea (provisional estimate of 3,368; CV = 0.29) (where most sightings were in a region of particularly high productivity along the shelf break) than in the southeastern Bering Sea (provisional estimate of 683; CV = 0.32) (Moore et al., 2002). During sighting cruises in July-August 2001-2003 of coastal waters (up to 85 km offshore) between the Kenai Peninsula (150° W.) to Amchitka Pass (178° W.), fin whales were observed from east of Kodiak Island to Samalga Pass (Zerbini et al., in preparation, cited in Angliss and Lodge, 2005). Zerbini et al. (In prep., cited in Angliss and Lodge, 2005) estimated 1652 (95% CI = 1142-2389) fin whales occurred in this area. Based on these data, and those of Moore et al. (2002), NMFS provided an "initial estimate" of abundance of 5,703 fin whales west of the Kenai Peninsula. The NMFS considers this a minimum estimate of abundance for the stock because no estimate is available east of the Kenai Peninsula (Angliss and Lodge, 2005). Angliss and Lodge, (2005) provided a PBR for the Northeast Pacific Stock of 11.4.

A.2.c(8) Historic and Current Distribution Patterns

During the "summer" (defined by Mizroch et al., [draft manuscript] as April-October, a period overlapping that of the proposed seismic survey) fin whales inhabit temperate and subarctic waters throughout the North Pacific including the Gulf of Alaska and other areas (Mizroch et al., 1984). The summer southern range in the eastern North Pacific extends as far south to about 32° North Latitude, and rarely, even farther south off Mexico. During the historic whaling period, "summer" concentration areas included, but were not limited to, the Bering Sea-eastern Aleutian Ground (60° N.-70° N., 175° E.-180° E., plus 45° N.-65° N., 180°-165° W.) and the Gulf of Alaska Ground (also called the Northwest Coast Ground) (45° N.-55° N., 165° W.-160° W., 45° N.-60° N., 160° W.-134° W.), and the Vancouver Ground (40° N.-55° N., 134° W.-125° W.) (Mizroch et al., draft manuscript). Mizroch et al.'s summary indicates that the fin whales range across the entire North Pacific from April to October, but in July and August concentrate in the Bering Sea-eastern Aleutian area. In September and October, sightings indicate that fin whales are in the Bering Sea, the Gulf of Alaska, and along the U.S. coast as far as Baja California (in October) (Mizroch et al., draft manuscript).

Most fin whales are believed to migrate seasonally from relatively low latitude winter habitats, where breeding and calving take place to relatively high latitude summer feeding habitats (Perry et al., 1998). The degree of mobility of local populations, and perhaps individuals, differs, presumably in response to patterns of distribution and abundance of their prey (Reeves et al., 1991; Mizroch et al., draft manuscript). Some populations migrate seasonally up to thousands of kilometers, whereas others are resident in areas with adequate prey (Reeves et al., 1999). At least some individuals make long movements between wintering areas off Mexico and California to summer feeding areas in the Gulf of Alaska (Mizroch et al., draft manuscript). Angliss and Lodge (2005) reported that fin whales in the North Pacific generally are reported off the North American coast and Hawaii in winter and in the Bering Sea in summer. Passive acoustic data (McDonald and Fox, 1999) document that Hawaii is used in the winter by fin whales but indicate that densities are likely lower than those in California (Barlow, 1995; Forney, Barlow, and Carretta, 1995).

However, observations summarized by Mizroch et al. (draft manuscript) and reported elsewhere demonstrate that there are many fin whales in many locations in northerly waters as far north as 60° N. latitude in winter months. For example, in the 1960's, 20 fin whales were sighted in the GOA in January (Berzin and Rovnin, 1966). Fin whales have been observed near Kodiak Island and in Shelikof Strait in all seasons of the year (Mizroch et al, draft manuscript; Wynne and Witteveen, 2005). Mizroch et al. (draft manuscript) point out, however, that fin whales with small calves have not been seen during the winter months, and that it has not been demonstrated that individual whales are year-round residents in the northern areas. Thus, during many different times of the year, fin whales have been observed in widely scattered locations throughout their range in the North Pacific, but areas where concentrations have been observed change seasonally.

Reeves et al. (1999) reported that fin whales tend to feed in summer at high latitude and fast, or feed little at winter lower latitude habitats. During visual cetacean surveys in July and August 1999 in the central Bering Sea, "…aggregations of fin whales were often sighted in areas where the…echo sounder …identified large aggregations of zooplankton, euphausiids, or fish" (Angliss, DeMaster, and Lopez, 2001:160). Catch densities and sightings show concentrations of fin whales within a highly productive "Bering Sea Green Belt" along the shelf edge (Mizroch et al., draft manuscript). Recent acoustic data document high levels of fin whale call rates along the U.S. Pacific coast from August to February (Moore et al., 1998; Watkins et al., 2000). The patterns of fin whale calls detected "…generally corresponded to seasonal productivity in the areas monitored…" (Moore et al., 1998:623) and have been interpreted as a possible indication of the importance of this area for fin whale feeding during winter (Angliss and Lodge, 2002).

The importance of specific feeding areas to populations or subpopulations of fin whales in the North Pacific is not understood. In the North Atlantic, 30 to 50% of identified individual fin whales returned to specific feeding areas in subsequent years (Seipt et al., 1986). The timing of arrival at feeding habitats can vary by sex and reproductive status, with pregnant females arriving earlier (Mackintosh, 1965).

A.2.c(9) Use of the GOA and the Seismic Survey Area

Whaling records indicate that the fin whales were abundant in the GOA prior to exploitation (Nemoto and Kasuya, 1965). More than 150 fin whales were taken just south of the Kenai Peninsula. Multiple smaller groups were taken offshore of areas south of Kodiak Island and the Alaska Peninsula to Unimak Pass, and large numbers were taken throughout the northern Gulf in an area bounded on the south at approximately 53° N. latitude. Data indicate that fin whales inhabit some areas in the northern GOA in every season, and that the distribution and relative abundance of fin whales in this large area varies seasonally. Fin whales have been observed in all seasons in Shelikof Strait, bays on Kodiak Island (especially on the west side), and the GOA (Zweifelhofer, 2002, pers. commun.; Mizroch et al., draft manuscript; Wynne and Witteveen, 2005) but seasonal usage varies (Mizroch et al., draft manuscript; Wynne and Witteveen, 2005; Baraff et al., 2005). In the 1960's, 20 fin whales were sighted in the GOA in January (Berzin and Rovnin, 1966). Mizroch et al. (draft manuscript) concluded that fin whales likely are present in waters of Shelikof Strait, off the Kodiak Archipelago, and other northerly areas in winter because of the presence and distribution of their prey, including forage fish. In May-July, sighting data indicate high use of the Gulf of Alaska, while August data show fewer sighting in the Gulf of Alaska. Mizroch et al. (draft manuscript) confirmed that fin whales from both sides of the Pacific concentrate in the Bering Sea-eastern Aleutian Island area in July and August and move along the continental shelf edge following the retreating ice.

A.2.d Humpback Whale (*Megaptera novaeangliae*) (Central and Western North Pacific Stocks) – Endangered

A.2.d(1) Summary

The humpback whale is a medium-sized baleen whale that inhabits a wide range of ocean habitats, including documented use of areas adjacent to the area in which the seismic survey would occur. We refer readers to USDOI, MMS (2003) and to the recently revised stock assessments for these two stocks (Angliss and Lodge, 2005) for detailed information beyond the scope of this EA.

A.2.d(2) Current Status and Protective Legislation

The IWC banned commercial hunting of humpbacks in the Pacific Ocean in 1965 (Perry et al., 1999c). Humpback whales were listed in 1973 as endangered under the ESA and as depleted under the MMPA. All stocks in U.S. waters are considered endangered (Perry et al., 1999c, citing U.S. Dept. of Commerce, 1994b). The NMFS published a Final Recovery Plan for the Humpback whale in November 1991 (NMFS, 1991b). On May 3, 2001, NMFS (66 *FR* 29502) published a final rule that established regulations applicable in waters within 200 nautical miles (nmi) of Alaska that made it unlawful for a person subject to the jurisdiction of the U.S. to approach, by any means, within 100 yards (yd) (91.4 m) of a humpback whale. To prevent disturbance that could adversely affect humpbacks and to reduce threats from whale watching activities, NMFS also implemented a "slow, safe speed" requirement for vessels transiting near humpbacks. Exemptions to the rule were for commercial-fishing vessels during the course of fishing operations; for vessels with limited maneuverability; and for State, local, and Federal vessels operating in the course of official duty.

A.2.d(3) Current Stock Definitions, Population Structure, and Distribution

There is "no clear consensus" (Calambokidis et al., 1997:6) about the population stock structure of humpback whales in the North Pacific. Recently, NMFS (Angliss and Lodge, 2002, 2005) concluded that there are at least three relatively separate populations within the U.S. Exclusive Economic Zone that move seasonally between winter/spring calving and mating areas and summer/fall feeding areas:

1. a California/Oregon/Washington and Mexico stock;
2. a Central North Pacific stock, which spends the winter/spring in the Hawaiian Islands and migrates seasonally to northern British Columbia, Southeast Alaska, Prince William Sound, and west to Unimak Pass; and
3. a western North Pacific Stock, which spends the winter/spring in Japan and migrates to spend summer and fall to areas west of Unimak Pass (the Bering sea and Aleutian Islands) and possibly to the Gulf of Anadyr (NMML unpublished data, cited in Angliss and Lodge, 2004).

Based on this breakdown, it is not unlikely that two or more populations of humpbacks (also referred to as stocks in titles of stock assessments) reasonably could be expected to occur seasonally with differing frequencies in the South Alaska and Bering Sea areas. To ensure compatibility with titles of NMFS annual stock assessments, we refer to these groups in the remainder of the document as the Western North Pacific Stock and the Central North Pacific Stock

A.2.d(4) Feeding

Humpbacks tend to feed on summer grounds and to not eat on winter grounds. However, some low-latitude winter feeding has been observed and is considered opportunistic (Perry et al., 1999c). They engulf large volumes of water and then filter small crustaceans and fish through baleen plates. In the Northern Hemisphere, known prey includes: euphausiids (krill); copepods; juvenile salmonids, *Oncorhynchus* spp.; Arctic cod, *Boreogadus saida*; walleye pollock, *Theragra chalcogramma*; pollock, *Pollachius virens*; pteropods; and cephalopods (Johnson and Wolman, 1984; Perry et al., 1999c). Bottom feeding recently has been documented in humpbacks off the east coast of North America (Swingle et al., 1993). Within a feeding area, individuals may use a large part of the area. Two individual humpbacks sighted in the Kodiak area were observed to move 68 km (~42.25 mi) in 6 days and 10 km (~6.2 mi) in 1 day, respectively (Waite et al., 1999). In the Kodiak Archipelago, winter aggregations of humpbacks were frequently observed at the head of several bays where capelin and herring spawn (Witteveen et al., 2005), a pattern similar to that reported to Southeast Alaska where sites occupied in the winter are coincident with areas that have overwintering herring.

A.2.d(5) Reproduction

Humpbacks give birth and presumably mate on their wintering ground. Thus, the area of and near to the proposed seismic survey is unlikely to be used for calving. Neonates are unlikely to be exposed to this activity in Cook Inlet.

A.2.d(6) Rates and Sources of Mortality and Other Factors Potentially Influencing Recovery

Causes of natural mortality in humpbacks in the North Pacific are relatively unknown, and rates have not been estimated. There are documented attacks by killer whales on humpbacks, but their known frequency is low (Whitehead, 1987; Perry et al., 1999c). Lambertsen (1992) cited giant nematode infestation as a potential factor limiting humpback recovery.

Based on sighting histories of individually identified female humpback in the North Pacific compiled between 1979 and 1995, Gabriele et al. (2001) calculated minimal and maximal estimates of humpback whale calf survival in the North Pacific of 0.150 (95% CI = 0.032, 0.378) and 0.241 (95% CI = 0.103, 0.434), respectively.

Human sources of mortality, disturbance, and other effects on humpbacks, including commercial whaling, are discussed in the cumulative effects section of this EIS.

A.2.d(7) Distribution

Humpback whales range throughout the world's oceans, with lower frequency use of Arctic waters (Perry, DeMaster, and Silber, 1999c; Angliss and Lodge, 2002, 2005). In the North Pacific each year, most (but not all individuals in all years) humpbacks undergo a seasonal migration from wintering habitats in tropical and temperate regions (10°-23° N. latitude), where they calve and mate, to more northern regions, where they feed on zooplankton and small schooling fish species in coastal and inland waters from Pt. Conception, California to the Gulf of Alaska and then west along the Aleutian Islands, the Bering Sea, the Kamchatka Peninsula and to the southeast into the Sea of Okhotsk (Angliss and Lodge, 2002, 2005; Nemoto, 1957). During the period of commercial whaling, there are reports of this species in the southwestern Chukchi Sea. Feeding areas tend to be north of about 30° N. latitude, along the rim of the Pacific Ocean basin from California to Japan. The NMFS (as reported by Angliss and Lodge, 2005) summarized that "…new information… indicates that humpback whales from the western and Central North Pacific stocks mix on summer feeding grounds in the central Gulf of Alaska and perhaps the Bering Sea." Individuals tend not to move between feeding areas. Mizroch et al. (2004) summarized that, based on all sightings, fewer than 2% of all individuals sighted were observed in more than one feeding area.

A.2.d(8) Historic and Current Abundance in the North Pacific

The reliability of pre- and post-exploitation and of current abundance estimates is uncertain. Rice (1978b) estimated there were about 15,000 humpbacks in the North Pacific prior to commercial exploitation. Johnson and Wolman (1984) and Rice (1978a) reported rough estimates of 1,200, and 1,000, respectively, of the numbers of humpbacks surviving in the North Pacific after the cessation of commercial whaling for humpbacks in 1966, but Perry, DeMaster, and Silber (1999c) cautioned that it is unclear whether these estimates are for the entire North Pacific or only the eastern North Pacific. With respect to the estimate of Johnson and Wohlman and another postexploitation estimate of 1,400 by Gambell (1976), Calambokidis et al. (1997) concluded that "…the methods used for these estimates are uncertain and their reliability questionable."

Calambokidis et al. (1997) estimated the abundance of humpback whales in the mid-1990's in the wintering areas to be as follows: 394 (CV = 0.084) for the Western North Pacific Humpback whale stock; 4,005 (CV = 0.095) for the entire Central North Pacific stock on the wintering grounds in Hawaii; and about 1,600-4,200 for Mexico. Mobley et al. (2001) estimated abundance in the Hawaiian Islands in 2000 to be 4,491 (95% CI:3146-5836). In Prince William Sound, 315 individual humpbacks have been identified between 1977-2001 (von Ziegesar et al., 2004, as cited in Angliss and Lodge, 2004). Waite et al. (1999) estimated that the annual abundance of humpbacks in the Kodiak area to be 651 (95% CI: 356-1523). Straley et al. (2002) estimated that the abundance of humpback whales in Southeast Alaska is 961. There are not conclusive (Perry et al., 1999c) or reliable (Angliss and Lodge, 2004) data on current population trends for he western North Pacific stock. However, based on aerial surveys on the wintering grounds in Hawaii during 1993-2000, Mobley et al. (2001) estimated that the Central North Pacific stock is increasing by about 7%.

Angliss and Lodge (2004) provided a PBR (defined as "the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population) (16 U.S.C. 1632) of 1.3 and 12.9 animals for the Western North Pacific Humpback Whales population and the Central North Pacific Stock, respectively. They provided a PBR of 3.0 animals for the Southeast Alaska portion of the Central North Pacific Stock.

Based on the estimates for the three wintering areas, Calambokidis et al. (1997) reported that their best estimate for humpbacks in the North Pacific was 6,010 (SE ± 474). Adjusting for the effects of sex bias in their sampling and use of the higher estimate for Mexico yielded an estimate of about 8,000 humpback whales in the North Pacific. Perry, DeMaster, and Silber (1999c) concluded that the Calambokidis et al. (1997) estimate of about 6,000 probably was too low.

A.2.d(9) Use of the GOA Area, Including Areas near Cook Inlet

In the summer, humpback whales regularly are present and feeding in many areas near and within the GOA and Bering Sea. Within the GOA, evidence indicates that the entrances to Cook Inlet and the Barren Islands (e.g., Sease and Fadely, 2001; USDOI, MMS, 2003), portions of the Kodiak Archipelago area and adjacent waters, Prince William Sound are among, but not the only, important feeding areas for humpback whales (Waite et al., 1999; Witteveen et al., 2005; Wynne and Witteveen, 2005). We are not aware of any current estimates of the number of humpbacks that typically feed in the Cook Inlet and Barren Islands area. The typical intensity of use of this area by humpbacks at different times throughout the late spring through the autumn period is not known. In comments on the draft EIS, NMFS reported that humpbacks also have been observed feeding near the Kenai Peninsula north and east of Elizabeth Island. Witteveen et al. (2005) reported that a feeding group of humpbacks is present year-round in the Kodiak Archipelago. During acoustic monitoring from May 26 to September 11, 2000, a timeframe slightly overlapping the time period of the proposed seismic survey of the area south of Kodiak Island, a large number of humpback whale calls were detected (Waite, Wynne, and Mellinger, 2003).

Based on aerial (1985) and vessel (1987) surveys, Brueggeman et al. (1989) suggested that there are discrete groups of humpbacks in the Shumagins, but data are insufficient to characterize numbers or structure of humpbacks in this area (Waite, Wynne, and Mellinger, 1999). During a 1994 ship survey in which a zig-zag pattern was followed extending about 200 nmi (370 km) southward between Tanaga Island in the Aleutians and the south end of the Kodiak Archipelago, Forney and Brownell (1996) observed humpback whales throughout the study area, especially in the eastern half, nearer to Kodiak Island and south of the Alaska Peninsula between 152° and 165° W. longitude. Humpbacks also were observed scattered throughout the western region surveyed between 167° and 175° W. longitude. During ship surveys of 2,032 km in the eastern Bering Sea from June 5 to July 3, 2004, humpback whale sightings were scattered, with most seen near shore from Akutan Island and west along the northern coast of the Alaska Peninsula (Waite, 2004:Fig. 3). Waite (2004) reported that the most northerly humpback sighting was about 300 km north of the Pribilof Islands. In the summer, humpback whales regularly are present and feeding in areas near and within the Bering Sea (e.g., Moore et al., cited in Angliss and Lodge, 2002, 2004).

A.2.e North Pacific Right Whale (*Eubalaena glacialis*; also referred to as *E. japonica*); Eastern North Pacific Stock – Endangered

A.2.e(1) Basic Description

The North Pacific right whale (also referred to historically as *Balaena glacialis*) is a medium-sized, baleen whale. It is one of the most critically endangered species of large whale (IWC, 2001b; Brownell et al., 2001). The Northeast stock of this species is the world's most depleted population of large whale (NMFS, 1991c; Tynan, 1999). Because of its rarity, definitive information about many basic aspects of the status and ecology of North Pacific right whales remains unknown.

A.2.e(2) Use of the GOA and Cook Inlet by Right Whales

It is clear that the GOA, including areas adjacent to the Kenai Peninsula and the Kodiak Archipelago, was historically an area of high abundance for right whales during the summer (e.g., Maury, 1851; Rice, 1974; Webb, 1988; Scarff, 1991; Waite, Wynne, and Mellinger, 2003: Clapham et al., 2004). Historic areas of summer concentration included the Northwest or "Kodiak" Grounds in the Gulf of Alaska (defined by Rice, 1974 as Vancouver Island, Gulf of Alaska and eastern Aleutian Islands) (see Maury, 1851, reproduced in Scarff, 1986 as Fig. 1; Rice, 1974), the eastern Aleutians, southeastern Bering Sea, Sea of Japan, and Sea of Okhotsk (67 *FR* 76600; Brownell et al., 2001), the Kurils and Kamchatka. The NMFS (1991c) summarized that right whales were especially abundant in the Gulf of Alaska from 145° to 151° W. longitude). Maury's (1852) charts, indicating 19th Century harvests and sightings of right whales, indicate that historically right whales used "…virtually the entire Gulf of Alaska " (Clapham et al. 2004:3).

There was very little whaling effort in the eastern North Pacific during January through March, supporting other information indicating that the whales left the area. However, weather conditions in the Gulf of Alaska also probably influenced whaling schedules. Right whales were more widely dispersed in fall and spring in midocean from the Sea of Japan to the eastern Bering Sea.

A remnant population (or populations) survived 19th Century exploitation in the eastern North Pacific. As recently as the 1960's, the Gulf of Alaska was an area of significant abundance for North Pacific right whales. Right whales were still sighted in the Gulf of Alaska by scout and catcher boats between 1960 and 1978 (Wada, 1975, 1978; Brownell et al., 2001). While scout boats were in the Gulf of Alaska from May to September, right whales were only observed from June through August. Data from Doroshenko (2000) documents that 252 right whales were taken illegally by Soviet whalers in the Gulf of Alaska alone between 1963 and 1966 (141, 88, 20, and 3, respectively) (data taken from Brownell et al., 2001:Table 3.2).

Because of the current extreme rarity of this species and this population stock, it has been observed only rarely, but occasionally, in the Gulf of Alaska in the last few decades (Brownell et al., 2001; Clapham et al., 2004). Waite, Wynne, and Mellinger (2003) reported that seven right whale sightings (note: this refers to the number of events, not the number of whales) were reported from the Gulf of Alaska, including the area south of the Alaska Peninsula (Brownell et al., 2001), from 1959 through 1997 through the NMML's Platforms of Opportunity Program, and one sighting (in Yakutat Bay in 1979 of four whales) was positively identified. None of these sightings was in the winter (Waite, Wynne, and Mellinger, 2003). No right whales were observed during a ship survey conducted between mid-June and late August 1980 in the Gulf of Alaska from Cape Fairweather to Chirikof Island, and including Shelikof Strait, Yakutat and Icy bays, Prince William Sound, and coastal waters from Chirikof to Dutch Harbor (Rice and Wolman, 1982). No right whales were observed during a ship survey in 1994 between the south tip of Kodiak Island along the south side of the Alaska Peninsula and the Aleutian Islands (Forney and Brownell, 1996). Wade et al. (2003) do not report seeing right whales during a ship survey in 2003 in the GOA. Right whales were not observed in waters around Kodiak during sea lion surveys conducted monthly between June 2001 and June 2004 (Baraff et al., 2005; Wynne and Witteveen, 2005). Right whales are not reported to have been observed during annual surveys of beluga whales in Cook Inlet conducted in June and/or July since 1993 (Rugh, Shelden, and Mahoney, 2000, Hobbs, Rugh, and DeMaster, 2000).

The most recent confirmed sighting of a North Pacific right whale in the GOA was of a single individual in the Gulf of Alaska south of Kodiak Island in July 1998 (Waite, Wynne, and Mellinger, 2003). Postobservation acoustic monitoring between May 26 and September 11, 2000 identified right whale vocalizations at several hydrophones deployed in the GOA from August 7, 200 to September 10, 2000 (Waite, Wynne, and Mellinger, 2003; Mellinger et al., 2004). Mellinger et al., 2004) could not estimate the number of animals from the detected calls. This information highlights the extreme depletion and current rarity of this species in nearshore areas of the GOA.

Thus, available data do not indicate right whales inhabit areas within or adjacent to lower Cook Inlet or are likely to be present when seismic surveys are conducted in lower Cook Inlet in September through mid-November. For the purposes of our analyses, we assume that right whales are not expected to occur within the area where the seismic survey would occur or in areas where noise levels could reasonably be expected to exceed 160 dB.

A.2.e(3) Critical Habitat for Right Whales

No critical habitat for the North Pacific right whale is designated

Summary. Available information on the occurrence of the North Pacific right whale indicates it is not likely it would be affected by the proposed seismic survey in lower Cook Inlet. We do not provide further information about this species, because additional information is not required to evaluate potential effects of this action. Because of its highly endangered status, any new information on its distribution or on proposals to designate critical habitat need to quickly be incorporated into environmental analyses of potential actions within its range.

A.2.f North Pacific Sei Whale Population (*Balaenoptera borealis*) – Endangered

Sei whales are large baleen, rorqual whales. They are found in all oceans (Reeves, Silber, and Payne, 1998). Sei whales primarily inhabit deepwater areas of open oceans, most commonly over the continental slope (Mitchell, 1975a; Martin, 1983; Reeves, Silber, and Payne, 1998) or in "in basins…between banks" (Reeves, Silber, and Payne, 1998:23). They are rarely found in cold polar seas or in near-coastal waters. We are not aware of any information that indicates they are known to occur or would be expected to occur within the proposed seismic survey area or in adjacent areas.

A.2.g Sperm whale (*Physeter macrocephalus*) (Alaska or North Pacific Stock) – Endangered

Sperm whales are large, toothed (odontocete) whales. They are "one of the most widely distributed of any marine mammal species" (Angliss, DeMaster, and Lodge, 2001:123) and are relatively abundant. Male sperm whales commonly feed in areas offshore in the Gulf of Alaska, waters around the Aleutian Islands, and in deeper waters of the Bering Sea during the summer in unknown abundance. Females and juveniles are found only rarely north of lat. 50º N. (Reeves and Whitehead, 1997). Sperm whales commonly are found in waters exceeding depths of 300 m and often are concentrated in upwellings and along the OCS and mid-ocean areas (Rice, 1989). We are not aware of any information that indicates they have been know to occur or are likely to occur in waters within or adjacent to the proposed seismic survey area.

A.2.h Steller Sea Lions (*Eumetopias jubatus*) – Endangered (Western Population Stock); Threatened (Eastern Population Stock)

A.2.h(1) Basic Description and Further References

The Steller sea lion is a large pinniped and the only living member of the genus *Eumetopias*, occur throughout the Gulf of Alaska and much of the Bering Sea. We refer readers to the following references for details that are beyond the scope of this document: the recent Biological Opinion and Incidental Take Statements related to Vessel Quotas and Operating Requirements for Glacier Bay National Park and Preserve (NMFS, 2003); the recent Biological Opinion and Incidental take Statement related to Commercial Groundfishery Fishery Management Plan (NMFS, 2001b) and the June 19, 2003, Final Supplement to this Biological Opinion (NMFS, 2003d) and the draft 2005 stock assessments for both stocks (Angliss and Lodge, 2005).

A.2.h(2) Population Stock Designations

Two population stocks of Steller sea lions were recognized within U.S. waters in 1997, based on demographic and genetic dissimilarities (Bickham, Patton, and Loughlin, 1996; Loughlin, 1997) (62 *FR* 30772). The eastern U. S. stock includes animals east of Cape Suckling, Alaska (144EW), and the western U. S. stock includes animals at and west of Cape Suckling (Loughlin 1997:Fig. 1).

A.2.h(3) Current Endangered Species Act Status and Protective Legislation

On November 26, 1990, Steller sea lions (considered as one population) were listed as threatened throughout their range under the ESA (55 *FR* 40202, as cited in NMFS, 2001c). The western population of Steller sea lions was listed as Endangered under the ESA on May 5, 1997 (62 *FR* 30772). The eastern population remained listed as threatened. If steady increases in the eastern population continue, this population may be considered for delisting over the next few years (NMFS, 2001a). Critical habitat for the Steller sea lion was designated on August 27, 1993 (58 *FR* 45269). A Final Recovery Plan for the Steller sea lion was published in December 1992. Recognizing that much new information needed to be incorporated into a revised recovery plan, and that new recommendations may be required, NMFS formed a new recovery team in October 2001.

A.2.h(4) Foraging Ecology and Prey

Results from unpublished studies by Loughlin et al. (cited in NMFS, 2001c) of Steller sea lion foraging within the Gulf of Alaska, the waters around the Aleutian Islands, and Washington State from 1994-2000 using satellite dive recorders showed that 93.8% of all locations from prebreeding and breeding-aged animals were within the 0- to 10-nmi zone, indicating that this zone is the most important habitat for Steller sea lion foraging (NMFS, 2001c).

In the Gulf of Alaska and the Bering Sea regions, data indicate sea lions prey on a variety of schooling fishes, including pollock, Pacific cod, Atka mackerel, sculpin, capelin, Pacific sand lance, rockfish, Pacific herring, and salmonids. Prey also includes cephalopods such as octopus and squid (Calkins and Goodwin, 1988). The relative percentage of different species in the diet differs throughout the range (NMFS, 2001c). Diving abilities may affect the prey available to yearlings (Merrick and Loughlin, 1997; Swain and Calkins, 1997). Prey size differs among different age classes of sea lions (Merrick and Calkins, 1995). The diets of sea lions differ strongly among areas and with time of year (DeMaster et al., 2001). “Areal differences occur at a scale of 10-100 km” (DeMaster et al., 2001:3).

Merrick and Loughlin (1997) showed that sea lions may forage over relatively wide ranges. These authors reported estimated home ranges of 320 square kilometers (km^2) for adult females in the summer, approximately 47,600 km^2 for adult females in the winter, and 9,200 km^2 for yearlings in winter. Adult females varied greatly in their estimated home ranges during the winter.

During the breeding season, males may fast for 1-2 months. The average foraging trip length and trip duration for adult females varies seasonally (see details summarized in USDOI, MMS, 2003:Section III.B.4.b(8)(f)). The trips of yearling sea lions are not as far or as long as those of adult females.

A.2.h(5) Evaluation of Causes of Decline

Loughlin (1998:91) reported: “Possible causes for the decline may include redistribution, changed vital rates, pollution, predation, subsistence use, commercial harvest, disease, natural fluctuation, environmental changes, and commercial fishing. The last two are now considered the most probable links to the decline. Steller sea lions may be affected by commercial fishing directly through incidental catch in nets, by entanglement in derelict debris, by shooting, or indirectly through competition for prey, disturbance, or disruption of prey schools.”

The NMFS (2001c:181) concluded:

> There is general scientific agreement that the decline of the western population of Steller sea lions in the 1990’s resulted primarily from declines in the survival of juvenile sea lions and lowered reproductive success in adult females. There is less scientific agreement that both of these problems have a dietary or nutritional component (Merrick et al., 1987, Pitcher, 1998, Rosen et al., 2000a, Alaska Sea Grant, 1993, DeMaster et al., 2001). There is less agreement on whether fishery-induced changes in the forage base…have contributed to and continue to contribute to the decline…(DeMaster et al.. 2001). The National Research Council (1996), based on the best scientific and commercial information available, concluded that the groundfish fisheries managed under the two FMPs may adversely affect Steller sea lions by (a) competing for sea lion prey and (b) affecting the structure of the fish community in ways that reduce the availability of alternative prey.

The NMFS (2001c) concluded:

> After considering all of the commercial fisheries that occur in the action area, especially in areas designated as critical habitat for sea lions, and comparing those fisheries against the various fish species consumed by Steller sea lions, we can conclude that commercial fisheries are likely to reduce the amount of prey…sufficient to reduce the habitat’s value to the sea lion population.

The NMFS (2001b) identified localized depletion of prey as a potential mechanism by which marine mammals may be disadvantaged by competition with commercial fisheries. Commercial fisheries can affect Steller sea lions and other predators of commercially harvested species in several ways: competition with fish predators; displacement from areas of high fish abundance due to disturbance; entanglement of sea lions or other predators; intentional killing; causing local depletion of prey, so that species such as

Steller sea lions must expend more energy in order to obtain the prey. Reasonable and Prudent Alternatives for the Gulf of Alaska and the Bering Sea/Aleutian Islands, pollock fisheries are based on concerns that these fisheries could be jeopardizing the recovery of Steller sea lions by the reducing the amount of prey available to them (NMFS, 2001b).

A.2.h(6) Reproductive Biology and Longevity

Males establish territories on rookeries in May before females arrive (Pitcher and Calkins, 1981). Pups are born during late May to early July. About 2 weeks after giving birth, females breed, with most mating occurring on land (Pitcher and Calkins, 1998). Females are known to nurse pups during the day. During the first week after birth, mothers generally stay with their newborn pups and then begin to go to sea on foraging trips. Observations in southeast Alaska (outside the range of the western population stock) by Trites and Porter (2002) indicate weaning occurs in early spring (i.e., April-June). Most, but not all, pups wean before their first birthday, but some females nurse offspring for a year or more.

Data indicate that females become sexually mature between 3 and 8 years of age and may continue to breed into their early 20’s. Females may live as long as 30 years (NMFS, 2001b). Data indicate that males reach sexual maturity at about the same range of ages as do females, but they are not successful at holding a breeding territory until they are at least 9 years of age. Males can remain on their territory for up to 7 years, but most are territorial for no more than 3 years (Gisiner, 1985). Males typically do not live beyond their mid-teens (NMFS, 2001b).

A.2.h(7) Mortality Causes and Patterns

The first winter after birth likely is a critical stage in the life history of Steller sea lions and may be key to understanding the ongoing population decline in most of Alaska (York, 1994; Trites and Larkin, 1996; Merrick and Loughlin, 1997). Young animals have smaller home ranges that mature females (Merrick and Loughlin, 1997), are inexperienced, may not be able to dive as deeply, and/or may simply have to learn how to forage effectively (Trites and Porter, 2002). Thus, they may be more limited in the prey available to them (Merrick and Loughlin, 1997) and susceptible to reductions in prey.

A.2.h(8) Historic and Current Population Distribution, Abundance and Trends

The Steller sea lion is distributed around the North Pacific Ocean rim from northern Hokkaido, Japan through the Kuril Islands and Okhotsk Sea, Aleutian Islands and central Bering Sea, southern coast of Alaska and south to the Channel Islands, California (Loughlin et al., 1984). The population is divided into Western and Eastern Stocks at 144° W longitude. The geographic center of their distribution is considered to be the Aleutian Islands and the Gulf of Alaska (Kenyon and Rice, 1961). The center of abundance for the species is considered to extend from Kenai to Kiska Island (NMFS, 2001c). The breeding range of this species includes most of the North Pacific Rim from approximately 34°-60° N. latitude (NMFS, 2001c) throughout which there are hundreds of Steller sea lion rookeries and haulouts.

Steller sea lion habitat includes terrestrial sites for breeding and pupping (rookeries), resting (haulouts), and marine foraging areas. Nearly all rookeries are at sites inaccessible to terrestrial predators on remote rocks, islands, and reefs. Locations of Steller sea lion rookery sites in Alaska are presented in NMFS (2001c) and USDOI, MMS (2003:Table III.B-5). During the nonbreeding season, sea lions of all ages and sexes aggregate at haulouts, but distribution at rookeries is segregated by sex and territorial status. Locations of Steller sea lion haulout sites in Alaska are presented in NMFS (2001c). Available evidence indicates that females return to the same rookery at which they were born to mate and give birth (Calkins and Pitcher, 1982; Loughlin et al., 1984).

At sea, Steller sea lions generally are found within the continental shelf area; they also inhabit pelagic regions (Fiscus et al., 1976; Merrick and Loughlin, 1997). At sea, adult males usually are observed alone, whereas females of all ages and subadult males comprise most large groups. Adult males are thought generally to disperse widely during the nonbreeding season. After weaning, juveniles are thought to disperse widely. Juveniles disperse more widely than adults until about 4 years of age. They do not return to the breeding site until they are close to reproductive age (Calkins and Pitcher, 1982).

Historic estimates of Steller sea lion abundance are crude and not well documented. Kenyon and Rice (1961) estimated the total North Pacific population of Steller sea lions to be about 240,000-300,000. Loughlin (1998:91) stated: "There were reportedly over 300,000 Steller sea lions in the world in the late 1970s. Since then, the Alaskan sea lion population has plummeted to a small fraction of earlier levels…." Loughlin also said: "Historically, the Gulf of Alaska and Aleutian Islands contained the largest fraction (74% in 1977) of the world population, but by 1989 it dropped to 56%" (Loughlin, 1998:93).
Based on the most recent pup counts (from 2002) from aerial surveys of the range of the eastern stock, is stock, NMFS (Angliss and Lodge, 2005) estimated that the total population of the eastern stock of Steller sea lions is 44,996. See Table 4 in Angliss and Lodge for counts of nonpups at trend sites throughout the range of the eastern U. S. Steller sea lion over time.

In the 1960's, the western population stock was believed to number about 177,000 (excluding pups) and to comprise about 92% of the total U.S. population. A population decline in Steller sea lions was first documented in the mid-1970's in the eastern Aleutian Islands. Braham et al. (1980) reported that sea lions in the eastern Aleutian Islands declined by about 50% as the population went from approximately 50,000 sea lions to 25,000 between the 1960's and late 1970's. In the late 1970's and early 1980's, dramatic and continuing declines began to be apparent in the central Aleutian Islands and eastward to the western GOA (Merrick et al., 1987). After a range-wide survey in 1989, it was apparent that the only areas that had remained stable were southeastern Alaska, British Columbia. NMFS (Angliss and Lodge, 2005) summarized that from 1990 to 2000, counts of Steller sea lions at trend sites for the western U. S. stock decreased 40%. Aerial surveys of nonpups were conducted in June of 2004 and ground based pup counts were conducted in June and July of 2001-2004 (NMML, unpublished data cited in Angliss and Lodge, 2005). A total of 29,037 nonpups were counted in 2004 at 262 rookeries and haul-out sites; 13,892 in the GOA and 15,145 in the Bering Sea/Aleutian Islands (NMML, unpublished data cited in Angliss and Lodge, 2005). In the GOA, 4,192 pups were counted and 5,284 pups were counted in the Bering Sea/Aleutian Islands. A total of 9,476 pups were counted in the range of this designated stock. By combining the 2001-2004 pup (9,476) with 2004 non-pup count data (29,037) NMFS (Angliss and Lodge (2005) reported a minimum abundance estimate of 38,513 Steller sea lions in the western U.S. stock in 2001-2004.

A.2.h(9) Use of the GOA and Cook Inlet

Steller sea lions reside in the GOA, the Bering Sea, and in associated waters including, but not limited to: Prince William Sound, Cook Inlet, Kachemak Bay, Bristol Bay, etc. The eastern stock of Steller sea lions from the eastern stock breed on rookeries located in southeast Alaska, British Columbia, Oregon, and California. The NMFS (Angliss and Lodge, 2005) summarized that there are no rookeries located in Washington. As noted above, sea lions breed throughout most of the North Pacific Rim from approximately 34° to 60° N. latitude. In this region, there are hundreds of Steller sea lion rookeries and haulouts (NMFS, 2001c). Outside of the breeding season, individuals disperse widely and individuals from many stocks may intermingle. Thus, both designated stocks of Steller sea lions could occur in GOA (and related) waters. Sea lions feed, mate, pup, rear their young, and mature in these areas. See Critical Habitat section below.

A.2.h(10) Sea Lion Critical Habitat

There are terrestrial and aquatic components of designated critical habitat and other habitat considered as critical habitat by NMFS in or on lands adjacent to the GOA, including in the Barren Islands, and marine areas adjacent to the southwestern Kenai Peninsula, and at the extreme southern end of Cook Inlet. There is additional critical habitat, including rookeries, haulouts, and marine foraging areas for the western population stock in Shelikof Strait, on and adjacent to the southern and northern sides of the Alaska Peninsula and the Aleutian Islands, and on other islands in the Bering Sea (see below).

Rookeries are areas used by adult males and females for pupping, nursing, and mating during the mating season (late May to early July). Haulouts are used by both males and females of all size classes but generally are not sites where reproduction occurs.

Critical habitat for the Steller sea lion was designated on August 27, 1993 (58 *FR* 45269). Critical habitat for Steller sea lions is listed in 50 CFR § 226.02. Critical habitat for Steller sea lions includes:

- A terrestrial zone that extends 3,000 ft (0.9 km) landward from the baseline or base point of each major rookery and major haulout.
- An air zone that extends 3,000 ft (0.9 km) above the terrestrial zone, measured vertically from sea level.
- An aquatic zone that extends 3,000 ft (0.9 km) seaward in State- and federally managed waters from the baseline or base point of each major haulout in Alaska that is east of 144º W longitude.
- An aquatic zone that extends 20 nmi (37 km) seaward in State- and federally managed waters form the baseline or base point of each major rookery and major haulout in Alaska that is west of 144º W longitude.

In the Biological Opinion on the effects of the Fisheries Management Plan, the NMFS (2001c:37) included 19 additional haulouts (in addition to those officially designated) "...as critical habitat for the purposes of this biological opinion…" to allow the Office of Protected Resources to "…make a more accurate determination of jeopardy and adverse modification based on the areas truly important to the western population of Steller sea lions" (NMFS, 2001c:Fig. 3.3).

The critical habitat for Steller sea lions includes two kinds of marine foraging habitat: (1) areas immediately around rookeries and haulouts and (2) three special aquatic foraging areas where large concentrations of important Steller sea lion prey species occur and where Steller sea lions are known to forage.

Marine areas around rookeries and haulouts were designated (NMFS, 2001c:35)

> …based on evidence that lactating adult females took only relatively short foraging trips during the summer (20 km [kilometers] or less; Merrick and Loughlin, 1997). These areas were also considered important because young-of-the-year sea lions took relatively short foraging trips in the winter (about 30 km; Merrick and Loughlin, 1997) and are just learning to feed on their own, so the availability of prey in the vicinity of rookeries and haulouts appeared crucial to their transition to feeding themselves.

The three special Steller sea lion foraging areas are the Shelikof Strait Foraging Area, Bogoslof Foraging Area in the Bering Sea shelf, and Sequam Foraging Area.

The NMFS (2001c) recently concluded that prey resources are the most important feature of marine critical habitat for Steller sea lions. They state that the at-sea distribution of the animals is critical to understanding impacts of fisheries on sea lions and their critical habitat. For the purposes of our evaluation, we assume that the same is true regarding evaluating the effects of the proposed action.

The areas of critical habitat from 0-3 nmi and from 3-10 nmi from shore are considered to be one of the highest areas of concern. This is because roughly 95% of the observations of at-sea observations of pups in winter were in the zones from 0-10 nmi, and winter is considered to be the most crucial period for pups and juveniles. The area 10-20 nmi from shore is considered to be of low to moderate concern for foraging Steller sea lions (NMFS, 2001c). The zone beyond 20 nmi from shore is considered to be of low concern for foraging sea lions. Available information indicates that sea lions foraging in these areas are presumed to be older juveniles and adults that are likely to have advanced diving and foraging ability. The spatial dispersion zone (beyond 10 nmi from shore) also is considered an area of low concern for foraging sea lions, primarily because only 1.9% of the observations of at-sea observations of pups in winter were beyond 10 nmi (NMFS, 2001c).

A.2.i Sea Otters (*Enhydra lutris*) (Southwest Alaska Distinct Population Segment of the Northern Sea Otter) – Proposed for Listing as Threatened

We provided considerable detail about the biology, status, population stock designations, and regulatory status of the designated Southwest Alaska stocks of sea otters, and about sea otters in general, in USDOI, MMS (2003). We refer readers to that document; the proceedings from the recent workshop on sea otters (Maldini et al., 2004); the Proposed Rule to List (69 *FR* 6600) and other listing documents (65 *FR* 67343);

recent stock assessments (Angliss and Lodge, 2004); and reviews in Kenyon (1969), Rotterman and Simon-Jackson (1988), and Riedman and Estes (1990) for details beyond the scope appropriate here.

The FWS has delineated the range of the Southwest Alaska Distinct Population Segment (DPS) of the Northern sea otter as extending from the western tip of the Aleutian Islands through the Alaska Peninsula and the Kodiak Archipelago and extending along the western shore of Cook Inlet).

Thus, this DPS is not expected to occur in waters within or adjacent to where this seismic survey could occur. In comment 111-042 on the draft of the draft EIS for Cook Inlet Lease Sales 1991 and 199 (USDOI, MMS, 2003:Sec. VII), the FWS stated that during a survey of lower Cook Inlet in 2002:

> The results of this survey indicate that while considerable numbers of sea otters inhabit the Kamishak Bay area in lower western Cook Inlet, their distribution does not overlap significantly with the proposed lease sale area….

The FWS has concluded that sea otters that occur on the eastern side of Cook Inlet belong to the Southcentral Alaska stock. This stock is not proposed for listing under the ESA and, thus, we discuss sea otters in the non-endangered marine mammal section.

A.3. Effects on Endangered and Threatened Marine Mammals

A.3.a Summary

We do not expect a significant effect, as we have defined it, on any species of marine mammal that is listed under the ESA, proposed for listing, or under review for potential listing under that act due to the proposed seismic survey by Veritas in lower Cook Inlet. This primarily is due to the exact location of the seismic survey; the small size of the proposed seismic survey area; the likely distribution and abundance of ESA-covered species when the survey will occur; and the fact that, while at least one airgun may be firing continuously for many days or weeks at a time, the full array will only be operating during slack tides. There is not information available to MMS that indicates large numbers or aggregations of any ESA-covered species of marine mammal are likely to be near the seismic survey area in September to mid-November. Individuals of five ESA species: beluga whales, fin whales, humpback whales, and two stocks of Steller sea lions could be adversely affected by the survey. We would expect the primary response of marine mammals in the area to be avoidance while the airguns are firing, particularly when the full array is firing. This could adversely impact individuals if they were attempting to feed or engage in some other beneficial activity at the time of the survey, but not adversely impact the populations of these species. Of all four species named, Steller sea lions probably are the most likely to be exposed to noise associated with the survey. If beluga whales are attracted to the region of the seismic survey due to the Steelhead run in the Anchor River and other streams, they could be adversely affected if the seismic survey caused them to avoid an important food source. However, we are not aware of information that suggests belugas usually feed in this region in early to late autumn. Fin whales probably are the least likely of the aforementioned species to be affected by the survey.

The behavior of individual Steller sea lions from both populations, but particularly from the western population, in the water potentially could be modified by noise and other disturbance from seismic surveys. Steller sea lions could temporarily avoid the area, potentially temporarily losing access to food near the Anchor River or other nearby streams. If such effects occur, they are likely to be temporary. The behavior of humpback and, less likely, fin whales engaged in feeding and other activities in the southern portions of lower Cook Inlet could be adversely affected by noise from seismic exploration in leasing blocks in these areas. Whales, particularly females with calves, might avoid the area during seismic surveys. If such effects occur, they would be localized and relatively short term. Local effects on the behavior, movement patterns, or habitat use of Cook Inlet belugas could occur because of disturbance from seismic exploration and related support vessels. These effects are more likely if they occur in the non-summer months when belugas are more likely to be in the lower Cook Inlet area.

We do not expect large oil spills during seismic exploration.

The proposed seismic survey in the relatively nearshore waters of lower Cook Inlet near and northwest of Anchor Point is not likely to have any discernible effects on blue whales, sperm whales, North Pacific right whales, or sei whales, primarily because these species do not typically occur within, near, or within 9 km of the proposed Cook Inlet lease-sale area. A small number of sei whales have been observed in areas south of the proposed seismic survey where they potentially could detect noise from this seismic survey and be adversely affected by activities associated with the proposed sale. However, their occurrence in such areas is rare. For this reason, no adverse effects on even individual sei whales are likely. We believe the possibility of these species being disturbed or otherwise adversely affected by the noise from this survey is discountable because of the timing of the survey and, primarily because distribution data indicate it is unlikely these species would be present in an area where the sound from this survey was likely to pass.

Noise associated with the seismic survey could affect cetaceans or other animals by masking important sounds (for example, the calls of conspecifics, the sounds of predators, the approach of a vessel), by damaging hearing, either temporarily or permanently, again affecting the animal's ability to hear important sounds, or by damaging prey or affecting prey availability. Noise also can cause exposed individuals to alter their behavior, either by avoiding or by approaching the source of the sound. In the case of exposure to extremely high-energy sounds at close distance, noise can cause death. Of these potential effects, avoidance by some species is most likely. Masking could occur. We do not expect injury or death.

A.3.b Consideration of the Summary in the Cook Inlet Multiple-Sale EIS

In Section IV.B.1.of the multiple-sale EIS for Cook Inlet Lease Sales 191 and 199 (USDOI, MMS, 2003), we assessed potential environmental consequences of the proposed lease sales and related routine activities, as well as possible effects of an oil spill. In Section IV.B.1.f(3)(b) and subsections therein, we discuss the effects of noise and disturbance associated with exploration on threatened and endangered species, including marine mammals. This section on noise and disturbance includes sections providing background information on noise from seismic surveys, as well as discussion of potential impacts (USDOI, MMS, 2003:I-74 to IV-90). We incorporate this information by reference. The threshold for significance by which we evaluated threatened and endangered species in the Cook Inlet draft EIS was an "adverse impact that results in a decline and/or change in distribution requiring one or more generations for the affected population to recover to its former status."

Our conclusions of potential effects on ESA species (beginning on page IV-70 of the final EIS) included (but were not limited to) the following statements about potential effects of the proposed action:

> It is unlikely that adverse effects to threatened and endangered species from routine and common activities of exploration, development or production will exceed the significance thresholds (as defined in Section IV.A.1). Effects to individuals (for example, displacement due to noise or other disturbance, collisions… etc.) and effects that are relatively localized…and short-term impact could occur due to such activities. Because they currently are in serious decline, displacement of western population Steller sea lions from important critical habitats, such as important feeding areas, potentially could result in a significant effect on the population if alternative, equally valuable food areas were unavailable to them or their shift to alternative areas displaced other Steller sea lions….
>
> Potential adverse effects of any kind are not likely for blue whales, North Pacific right whales, sperm whale….

Available information indicates these statements are still accurate. With respect to the proposed Veritas survey in Cook Inlet, designated critical habitat is not expected to be affected. If individual Steller sea lions feed nearby, this area has not, to our knowledge, been identified as a feeding area of high importance.

We have reviewed information from our Summary of Potential Effects (USDOI, MMS, 2003:Sec. IV.B.1.f(2)) that are relevant to the proposed seismic survey include the following:

> Routine activities of proposed OCS oil and gas exploration…in Cook Inlet are not likely to have any discernible effects on blue whales, sperm whales, North Pacific right whales…primarily

because these species do not typically occur within, near, or "downstream" of the proposed Cook Inlet lease-sale area.

A small number of sei whales have been observed in areas where they potentially could be adversely affected by activities…, but their occurrence in such areas is rare. For this reason, no adverse effects on even individual sei whales are likely.

In specific areas, particularly near the Barren Islands and Cape Douglas, the behavior of Steller sea lions from both populations, but particularly from the western population, in the water potentially could be modified by noise and other disturbance from seismic surveys…. However, most potential effects on Steller sea lions are related to activities that would occur during production.

…The National Marine Fisheries Service (1995) concluded that any impact of …oil- and gas-related activity that had an adverse effect on the production or availability of forage fish within sea lion critical habitats would have adverse impacts on this critical habitat.

The behavior of individuals from the Southwest Alaska stock of sea otters could be modified by noise and disturbance associated with exploration and development. The most likely impacts could be the disturbance of sea otters that are hauled out, and the displacement of females and pups that occur near regions of focused activity. If they occurred at all, these effects are expected to be local and have no population-level impacts on the widely distributed Southwest Alaska sea otter stock. In comments on a draft of the EIS, the Fish and Wildlife Service provided the following information to the MMS: "Our GIS analysis suggests that the geographic overlap between the proposed lease sale area and sea otters from the southwest Alaska" Distinct Population Segment "is minimal."

The behavior of feeding humpback whales and, less likely, fin whales, in the areas near the Barren Islands and Kennedy and Stevenson entrances could be adversely affected by noise from seismic exploration in leasing blocks in these areas. If they occurred, these effects would be localized and relatively short-term….

Small spills are unlikely to have serious adverse effects on threatened or endangered cetaceans. We do not expect large oil spills during exploration.

Local effects on the behavior, movement patterns, or habitat use of Cook Inlet belugas could occur because of disturbance from support vessels, drilling, seismic exploration, and other disturbance associated with oil and gas exploration and development….

…Some minor and short-term disturbance of these birds is possible due to overflying aircraft and vessel transit. It is possible that Steller's eiders could be killed or injured due to collisions with lighted platforms. Because these platforms would be offshore, the risk of this type of mortality probably is highest during migration and during foggy weather.

Noise and disturbance associated with pipeline construction and vessel transit to platforms could have temporary, localized impacts on the behavior of…resident sea otters, and beluga whales during the winter.

Based on our consideration of information available since the publication of the Cook Inlet multiple-sale EIS and of previously available information, and our analyses of potential effects based on the specific details of the Veritas proposed seismic survey in lower Cook Inlet, we believe that the conclusions reached in the multiple-sale EIS about seismic survey effects are generally still valid. As the 3-D seismic survey in eastern lower Cook Inlet near Anchor Point from September 5 to November 15, 2005, is proposed to be conducted, many of the most serious concerns associated with seismic surveys discussed in the final EIS, are not relevant to this survey because of the area in which it will occur.

However, we provide additional information regarding potential impacts of the survey to these species for the following reasons:

- the threatened, endangered, and/or the depleted status of these species
- new information on the status of some of these species that potentially could affect analyses
- direct information from NMFS related to the survey

- new information available about the potential effects of seismic surveys and anthropogenic sources of marine noise on marine mammals
- some of the species (e.g., Steller sea lions and Cook Inlet beluga whales) are subsistence species of nutritional and cultural importance to Alaska Natives

A.3.c Information from NMFS Regarding this Survey and Estimates of Noise Level Radii

By letter dated July 6, 2005 (NMFS, 2005a), NMFS notified MMS that the waters where the proposed survey would occur

> …may contain various species of marine mammals, including beluga whales, harbor porpoise, Steller sea lions, harbor seals, humpback whales, and fin whales. Seismic work has the potential to injure or harass these animals due to the introduction of very loud noise into the water column.

Of these species, Steller sea lions, humpback whales, and fin whales are listed under the ESA. Cook Inlet beluga whales are depleted under the Marine Mammal Protection Act and are a "Species of Concern" under the ESA. The NMFS (2005a) has recommended that they undergo review for consideration for listing under the ESA. In their July 6, 2005, letter, NMFS also concluded: "we believe that marine mammals will likely be in or near the project area…."

Regarding the estimation of noise-impact zones, NMFS (2005a:2) wrote: " The best scientific information is from Tolstoy et al. (2004) and their closet comparable tested array size to the airgun array being used in Cook Inlet is the 12-gun which is a 3755 cubic inch array with a 250 dB zero to peak. The radii for this configuration "in shallow water (defined in Tolstoy et al., 2004 as 98 ft or 30 m) is 160 dB = 9 km (recorded) and 180 dB = 2 km (recorded).

The NMFS acknowledged that the data used to determine the radii were for a larger array. However they state that the data from Tolstoy still represent a "considerable disparity" between the zones associated with the study of Tolstoy et al. (2004) and the safety zone developed by Veritas. The NMFS stated: "Because Veritas has not obtained an MMPA Incidental Harassment Authorization (IHA), they must be able to monitor and shut-down whenever marine mammals enter the 160-dB" re 1 micropascal radii, "using on-site verification tests prior to conducting seismic."

In our analyses, we assume that the 2 km and 9 km radii are the most appropriate estimates of the radii for 190 dB and 160 dB, respectively. The choice of these distances affects which species are and are not considered as potentially affected by the survey. It affects our conclusions about the likely effectiveness of mitigating measures.

A.3.d New Information Regarding Potential Effects of Seismic Surveys and other Marine Noise on Marine Mammals

Since the publication of the Cook Inlet multiple-sale final EIS (USDOI, MMS, 2003), there has been a considerable amount of focus on the effects of anthropogenic noise on marine mammals. We refer readers to the National Resource Council (NRC) (2003) volume entitle *Ocean Noise and Marine Mammals;* the section of the report dealing with seismic surveying in the IWC (2004) Scientific Committee's Standing Working Group on Environmental Concerns mini-symposium on acoustics; NRC (2004) Committee on Characterizing Biologically Significant Marine Mammal Behavior, and draft summaries from the Marine Mammal Commission's (MMC's) Advisory Committee on Acoustic Impacts on Marine Mammals. Further, we refer readers to the detailed background information, summaries, and detailed discussion of potential effects on threatened and endangered marine mammal contained in our Cook Inlet multiple-sale EIS (USDOI, MMS, 2003). We refer readers also to Appendix A, the Request by the University of Alaska to Allow the Incidental Take of Marine Mammals during a Marine Geophysical Survey across the Arctic Ocean (LGL and LGL, 2005). There are other summaries of information about noise characteristics and the effects of noise on marine mammals but in total, these sources provide updated summaries and discussion of most pertinent information.

Despite increasing concern and attention, there still is uncertainty about the potential impacts of sound on marine mammals, on the factors that determine response and effects, and especially on the long-term cumulative consequences of increasing noise in the world's oceans from multiple sources (e.g., NRC, 2003). Information about the propagation of sound is improving, but site specific effects suggest estimates of noise-level radii should be interpreted cautiously.

Concerns about the effects of noise on marine mammals and marine fish are increasing rapidly and several groups, such as the IWC, the Marine Mammal Commission (MMC), and the World Conservation Union-IUCN all have taken recent initiatives related to evaluation of the impacts of sound on marine mammals. For example the IWC and the IUCN recently discussed information related to a potential displacement by seismic surveys of western Pacific gray whales from a feeding area off of Sakhalin Island (IWC, 2005). At its mini-symposium on acoustics in July 2004, the IWC's Scientific Committee's Standing Working Group on Environmental Concerns discussed information related to a stranding of humpbacks in Brazilian waters, coincident in time with seismic surveys in the area. During the 2002 breeding season, during the same time that seismic surveys were being conducted on breeding grounds in Brazilian waters, eight strandings of adult humpback whales were reported, a frequency nearly 27% of the total stranding of adults reported in Brazilian waters between 1975 and 2003. There was no clear cause of the stranding. The IWC also discussed information related to a potential displacement by seismic surveys of western Pacific gray whales from a feeding area off of Sakhalin Island (IWC, 2004). Based on their discussions during the mini-symposium, both the IWC as a whole and its Scientific Committee agreed that there is compelling evidence of increasing sound levels, including sound from ships and seismic activities. The MMC has convened a committee to evaluate potential impacts of anthropogenic noise on marine mammals, and that group has prepared draft summary reports. These documents also highlight the complexity and uncertainty of understanding the potential for and significance of human-caused noise on marine mammals.

The NRC (2004) Committee on Characterizing Biologically Significant Marine Mammal Behavior concluded that it is unknown how or in what cases responses of marine mammals to anthropogenic sound rise to the levels of biologically significant effects. This group also developed an approach of injury and behavioral "take equivalents". These take equivalents use a Severity index that estimates the fraction of a take experienced by an individual animal. This severity index is higher if the activity could be causing harassment at a critical location or during a critical time (e.g., calving habitat).

Additional information also is available about propagation of seismic survey noise. During monitoring using passive acoustics in the mid-Atlantic Ocean, Nieukirk et al. (2004) frequently recorded sounds from seismic airguns from locations more than 3,000 km from their array of autonomous hydrophones moored near the mid-Atlantic Ridge. Trends in the patterns of detection were similar in the 2 years of monitoring with airguns being detected every 10 to 20 seconds. Nieukirk et al. (2004:1838) reported that:

> Although airgun sounds tended to dominate recordings during the summer months, loud whale vocalizations could still be detected during intense airgun activity…The high received level of these impulses on multiple hydrophones made it possible to estimate the location of the ships conducting the airgun surveys."

Probably most significantly, Tolstoy et al al. (2004) measured noise-level radii and found that model estimates of 160 dB and 180 dB radii in shallow water tended to be underestimated in shallow water and overestimated in deep water. Information from that study in the Gulf of Mexico is reflected in the estimates of the 160 and 180 dB radii cited by NMFS and assumed in our analyses.

A.3.e Mitigations

The analyses in this section assume the mitigations, discussed in Section III.B, are part of the proposed project. As stated in III.B, the 160-dB isolpleth radii referenced in the mitigation measures will be empirically determined by Veritas prior to the survey. Since empirical measures are not available for our analysis of potential effects, our analyses are based on the estimates recommended in the July 6, 2005, letter from NMFS (2005b) of radius of 9 km for the 160-dB isolpleth. If this radius is larger than the actual radius, our analyses may slightly overstate potential impacts. If it is smaller than the actual radius, the analyses may underestimate potential impacts.

In the following analyses, we have assumed that these mitigations are part of the proposed actions.

A.4 Potential Effects of the Proposed Seismic Survey on Threatened and Endangered Marine Mammals

A.4.a Potential Pathways of Impact

There are several pathways by which species that are designated as endangered, threatened, or candidate species under the ESA could be impacted by the proposed seismic survey: increased noise from the airguns (this is considered the primary pathway); increased noise, displacement, and possible strikes from the vessels involved in the seismic survey; and increased noise due to other marine sound-producing devices (e.g., bathymetric sonar signals or "pinger" signals). There is a slightly increased risk associated with vessel-related discharges of petroleum production. Endangered or threatened marine mammals conceivably could be struck by seismic ships or support vessels.

A.4.a(1) Noise and Disturbance Associated with Seismic Surveys

During seismic survey operations, human-caused noise is transmitted through the air and through marine waters from a variety of sources including, but not limited to, the firing of airguns and ship and boat transit. In Cook Inlet during OCS oil and gas activities, these sounds are propagated into an environment that already has numerous sources of human-caused sound, such as that from fishing and tour boats, tankers, barges, airplanes and helicopters, human settlements, and marine development (such as harbor construction).

Properties of the sound that influence how far that sound is transmitted, what species hear it, and what physical and behavioral effects it can have include its intensity, frequency, amplitude, wavelength, and duration in addition to the distance between the sound source and the animal, whether the sound source is moving or stationary, the level and type of background noise, and the auditory and behavioral sensitivity of the species (Richardson et al., 1995). The frequency of the sound usually is measured in Hertz, pressure level in microPascals (Gausland, 1998), and intensity levels in decibels (Richardson et al., 1995; McCauley et al., 2000). McCauley et al. (2000) and others cited therein express this in terms of its equivalent energy decibels re 1 microPascal root mean square (decibels re 1 μPa^2). The perceived loudness of any given sound is influenced by many factors including both the frequency and pressure of the sound (Gausland, 1998), the hearing ability of the listener, the level of background noise, and the physical environment through which the sound traveled before reaching the animal.

> The fate of sound in water can vary greatly, depending on characteristics of the environment through which it travels (Richardson et al., 1995; McCauley et al., 2000). Extrapolation about the likely impacts of a given type of sound source in Cook Inlet on a particular marine mammal, based on published studies conducted elsewhere, are somewhat speculative because characteristics of the marine environment such as bathymetry, sound-source depth, and seabed properties greatly impact the propagation of sound horizontally from the source (McCauley et al., 2000; see also Chapter 4 in Richardson et al., 1995 and references provided therein).

Richardson et al. (1995:425) summarized that: "…a site-specific model of sound propagation is needed to predict received sound levels in relation to distance from a noise source."

High-energy noise sources operated in the water column are used in offshore seismic surveys to provide geophysicists with profiles of the geologic structures below the seafloor. Airguns involve the rapid release of compressed air to produce a high-energy, impulsive signal that is directed downward through the seabed. Thus, the source for the sound is called an "airgun." However, sound from the airgun also is propagated horizontally, with the distance traveled depending on many factors, such as those discussed by Richardson et al. (1995) and McCauley et al. (2000). Richardson et al. (1995:290-291) summarized: "Underwater sound pulses from airgun arrays and similar sources are often audible many tens of kilometers away." The Joint Nature Conservation Committee of the United Kingdom (Stone, 2001:Appendix 1) reported that in modern, large-scale seismic surveys, the airgun array is fired at intervals of about 10 seconds, with timing depending on the exact objects of the survey.

Transient noise from seismic surveys has been recorded on land seismometer arrays 6,100 km away after traveling the deep sound channel (Okal and Talandier, 1986). As noted, they have been detected more than 3,000 km away in the mid-Atlantic Ocean. Seismic airguns are meant to produce low-frequency noise, generally below 200 Hertz. However, the impulsive nature of the collapse of the air bubbles inevitably results in broadband sound characteristics. Recently, Goold (1996, cited in Stone, 2001) reported that high-frequency noise also is produced. Goold (1996a) also found significant levels of energy from airguns across the bandwidth up to 22 kilohertz. McCauley et al. (2000) concluded that the most consistent measure of a received airgun signal was a measure of its energy, as was suggested by Richardson et al. (1995) for pulsed sounds.

McCauley et al. (2000) stated that a precise definition of the seabed to at least 50 to 100 m is required to accurately predict horizontal propagation along a travel path. Based on experimental measurement of signals from a single airgun, McCauley et al. (2000) found signal differences of airgun broadband levels of up to 10 dB at a 1-km range. They concluded that such large differences in levels, measured for the same source at a given range within the same bay, demonstrated the importance of localized properties of seabeds in determining sound propagation. Other factors that also can significantly affect sound propagation include the orientation of the receivers (the orientation of living animals could similarly affect reception), alignments and depths of array components and of functioning guns within the array, and airgun source depth. The depth at which the firing airgun is placed plays a crucial role in the potential for propagation. Increasing source depth consistently increased the received signal at any specified receiver depth (for example, the depth of the animal) and horizontal range. Upslope propagation, where the receiver is much shallower than the deeper placed sound source but is on the bottom, results in larger signal attenuation compared to propagation over similar distances but at a constant water depth. Thus, if the animal is in a shallow-water area and on the bottom, and the airgun is in much deeper water and downslope from the animal, attenuation will greatly affect the sound the animal will receive. Based on all of the aforementioned, McCauley et al. (2000) concluded that predicting sound propagation from any specified airgun array needs to be done on a case-by-case basis.

Because high-energy and impulsive sounds can cause hearing damage, there is considerable concern about the potential impacts of airguns on marine organisms. Sound from seismic surveys potentially could have negative impacts on marine mammals within or near the survey area. Because of the distance sound can travel through water, marine mammals in regions of Cook Inlet that are near to the areas of survey, or that are connected to the area of exploration by a relatively unimpeded sound travel path, also could be affected by the sound.

The low-frequency noise (generally below 200 Hertz) produced by seismic airguns is more likely to disturb baleen whales, which communicate at frequencies mostly below 3 kilohertz. Thus, their communications are more likely to overlap with those low frequencies than are the communications of beluga whales. However, because of the high-frequency noise that also is produced, marine mammals that are sensitive to high frequencies also can be affected. The hearing of beluga whales extends at least as low as 40 to 75 Hertz, but their sensitivity at this level probably is poor. The hearing range of at least some individual belugas extends up to 80 to 150 kilohertz (Richardson et al., 1995 and references cited therein). However, Richardson et al. (1995) caution that the estimated hearing thresholds for many species may be inaccurate and possibly too high at frequencies between 1 and 10 kilohertz.

A.4.a(2) Other Sources of Noise and Disturbance

During the seismic survey exploration, noise also is produced by on-board sonars and supply vessels. Airborne sounds from high-speed motorboats are especially relevant to Steller sea lions and, probably to a lesser extent, sea otters, because both species haul out. Ships produce noise from sounds coming from engines, vibrating and rattling structural components and, primarily, from cavitation of the propeller. Richardson et al. (1995) reported that the noise generated by a large container vessel, bulk carrier, or supertanker can exceed 190 dB up to 205 dB in the lowest frequencies.

A.4.b Potential General Impacts of Seismic Surveys

In this section, we provide background about potential effects of impacts of OCS oil- and gas-related noise and disturbance. This section should not be interpreted as indicating effects that are likely to occur due to the proposed action on any specific species, or group of species.

Hearing (auditory) systems and perception are species specific and habitat dependent. Because of these fundamental facts, the potential for a given sound to cause adverse effects to an animal also is species specific and habitat dependent. Because of differences in bathymetry and seabed characteristics of sites throughout the seismic survey area, the distances that sounds of various frequencies, intensities, and pressures will propagate, and the resulting effects such sounds could have may also differ among sites.

Available evidence also indicates that reaction to sound, even within a species, may depend on the listener's sex and reproductive status, possibly on age and/or accumulated hearing damage, type of activity engaged in at the time or, in some cases, on group size. For example, reaction to sound may vary depending on whether females have calves accompanying them, whether individuals are feeding or migrating. It may depend on whether, how often, and in what context, the individual animal has heard the sound before. All of this specificity greatly complicates our ability, in a given situation, to predict the impacts of sound on a species or on classes of individuals within a species. Because of this, and following recommendations in McCauley et al. (2000), we attempt to take a conservative approach in our analyses and base conclusions about potential impacts on potential effects on the most sensitive members of a population. In addition, we make assumptions that sound will travel the maximums observed elsewhere, rather than minimums.

Ketten (1998) reported that hearing loss can be caused by exposure to sound that exceeds an ear's tolerance (i.e., exhaustion or overextension of one or more ear components). Hearing loss to a marine mammal could result in an inability to communicate effectively with other members of its species, detect approaching predators or vessels, or echolocate (in the case of the toothed whales). Hearing loss resulting from exposure to sound often is referred to as a threshold shift. This occurs when such exposure results in hearing loss causing decreased sensitivity. This type of hearing loss is called a temporary threshold shift if the individual recovers its previous sensitivity of hearing, or permanent threshold shift if it does not.

Ketten (1998) reported that whether or not a temporary threshold shift or a permanent threshold shift occurs will be determined primarily based on the extent of inner ear damage the received sound and the received sound-level causes. In general, whether a given species will tend to be damaged by a given sound depends on the frequency sensitivity of the species. Loss of sensitivity is centered on the peak spectra of the sound causing the damage.

Permanent threshold shifts are less species dependent and more dependent on the length of time the peak pressure lasts and the signal rise time. Usually if exposure time is short, hearing sensitivity is recoverable. If exposure to the sound is long, or if the sound is broadband in higher frequencies and has intense sudden onset, loss might be permanent. Repeated long exposures to intense sound or sudden onset of intense sounds generally characterize sounds that cause permanent threshold shift in humans.

Ketten (1998) stated that age-related hearing loss in humans is related to the accumulation of permanent-threshold-shift and temporary-threshold-shift damage to the ear. Whether similar age-related damage occurs in cetaceans is unknown.

Many marine mammals rely primarily on hearing for orientation and communication (Erbe and Farmer, 1998). For example, the scientific community generally agrees that hearing is an important sense used by cetaceans (for example see Richardson et al., 1995; National Resources Defense Council, 2000). Marine mammals rely on sound to communicate, to find mates, to navigate, to orient (Erbe et al, 1999), to detect predators, and to gain other information about their environment. The NMFS (Carretta et al., 2001) summarized that a habitat concern for all whales, and especially for baleen whales, is the increasing level of human-caused noise in the world's oceans. Clapham and Brownell (1999) summarized that "…effects of ship noise on whale behavior and ultimately on reproductive success are largely unknown."

One of the greatest concerns associated with the impacts of seismic surveys on marine mammals has to do with potential impacts of noise on their ability to function normally, and on their health. A very powerful sound at close range can cause death due to rupture and hemorrhage of tissues in lungs, ears, or other parts of the body. At greater distance, that same sound can cause temporary or permanent hearing loss. Noise can cause modification of an animal's behavior (for example, approach or avoidance behavior, or startle).

When noise interferes with sounds used by the marine mammals (for example, interferes with their communication or echolocation), it is said to "mask" the sound (e.g., a call to another whale might be masked by an icebreaker operating at a certain distance away). If sounds used by the marine mammals are masked to the point where they cannot provide the individual with needed information, they can cause harm (Erbe and Farmer, 1998). That is, the presence of the masking noise can make it so that the animal cannot discern sounds of a given frequency and a given level that it would be able to do in the absence of the masking noise. In the presence of the masking sounds, the sounds the animal needs to hear must be of greater intensity for it to be able to detect and to discern the information in the sound.

Some studies have shown that following exposure to a sufficiently intense sound, marine mammals may exhibit an increased hearing threshold, called a threshold shift after the sound has ceased (e.g., Au et al., 1999; Kastak et al., 1999; Schlundt et al., 2000; Finneran et al., 2002). This shift is called a temporary-threshold shift if the threshold returns to pre-exposure levels over time. It is termed a permanent-threshold shift if the exposed animal does not regain its previous hearing threshold. Long-lasting increases in hearing thresholds, which also can be described as long-lasting impairment of hearing ability, could impair the ability of the affected marine mammal to hear important communication signals or to interpret a variety of echolocation signals (for example, for orientation, prey finding, or predator detection), as well as impair the mammal's ability to hear other important sounds such as sounds of predators, conspecifics (i.e., of the same species) or other whales (for example, sounds of breaching), or approaching vessels.

First, while there is some general information available, evaluation of the impacts of noise on marine mammal species, particularly on cetaceans, is greatly hampered by a considerable uncertainty about their hearing capabilities and the range of sounds used by the whales for different functions (Richardson et al., 1995; Gordon et al., 1998). This is particularly true for baleen whales. Very little is known about the actual hearing capabilities of the large whales or the impacts of sound on them. Research in this area is increasing. Most conclusions about likely effects are based on behavioral responses to sound, and on the assumption that they can hear the range of sounds they produce (NMFS, 2002 acoustic monitoring program web site). Thus, predictions about probable impact on baleen whales generally are based on assumptions about their hearing rather than actual studies of their hearing (Richardson et al., 1995; Gordon et al., 1998; Ketten, 1998).

Ketten (1998) summarized that the vocalizations of most animals are tightly linked to their peak hearing sensitivity. Hence, it is generally assumed that baleen whales hear in the same range as their typical vocalizations, even though there are no direct data from hearing tests on any baleen whale. Functional models indicate that the functional hearing of baleen whales extends to 20 Hertz, with an upper range of 30 Hertz. Blue, fin, and bowhead whales are predicted to hear at frequencies as low as 10-15 Hertz.

Species that are likely to be impacted by low-frequency sound include the baleen whales and the elephant seal. Pinnipeds typically have peak sensitivities between 1 and 20 kilohertz. Most pinnipeds do not have good hearing below 1 kilohertz.

Most species also have the ability to hear beyond their peak range. This broader range of hearing probably is related to their need to detect other important environmental phenomena, such as the locations of predators or prey. Ketten (1998:2) summarized that: "The consensus of the data is that virtually all marine mammal species are potentially impacted by sound sources with a frequency of 500 hertz or higher." This statement refers solely to the probable potential for marine mammal species to hear sounds of various frequencies. If a species cannot hear a sound, or hears it poorly, then the sound is unlikely to have a significant effect. Other factors, such as sound intensity, will determine whether the specific sound reaches the ears of any given marine mammal.

Gordon et al. (1998:Section 6.4.3.1) summarized that "Given the current state of knowledge, it is not possible to reach firm conclusions on the potential for seismic pulses to cause…hearing damage in marine mammals." Later in this review, they reach the same conclusion about the state of knowledge about the potential to cause biologically significant masking. "This review has certainly emphasized the paucity of knowledge and the high level of uncertainty surrounding so many aspects of the effects of sound on marine mammals." (Gordon et al., 1998:Section 6.12).

Considerable variation exists among marine mammals in hearing sensitivity and absolute hearing range (Richardson et al., 1995; Ketten, 1998). Because of suspected differences in hearing sensitivity, it is likely that baleen whales and pinnipeds are more likely to be harmed by direct acoustic impact from low to mid-sonic range devices than odontocetes. Conversely, odontocetes are more likely to be harmed by high-frequency sounds.

Information is better for smaller whales (e.g., beluga). Even with relatively well-studied whales such as belugas, new information (e.g., about the range of frequencies used for communication) can modify assumptions used in evaluating the effects of a specific noise, or group of noises, on the marine mammals of concern. All odontocetes (toothed whale) are believed to echolocate. Odontocetes are typically thought to use signals in the ranges between a few Hertz and about 20 kilohertz for communication (Richardson et al., 1995), a range that coincides with the frequency range of most underwater noises (Wenz, 1962; Richardson et al., 1995). Odontocete peak sensitivities generally are above 20 kilohertz.

For echolocation, toothed whales emit high-frequency sonar signals of up to 200 kilohertz (Richardson et al., 1995). Because of the overlap of frequencies of most underwater noise and communication signals, it generally is believed that such signals would be more affected than the high-frequency signals used for echolocation. Additionally, the signal-to-noise ratio is increased considerably (Erbe and Farmer, 1998) for echolocation signals due to the excellent directional hearing capabilities of odontocetes (Renaud and Popper, 1975; Zaitseva et al., 1980; Au and Moore, 1984) for high frequencies. However, the ability of various human noises to mask cetacean signals generally has been studied for high-frequency signals.

Erbe and Farmer (1998:1386) summarize that in "…the human and dolphin ear, low frequencies are more effective at masking high frequencies than *vice versa*; masking is maximum if the characteristic frequencies of the masker are similar to those of the signal…." They proposed that the factor most important for determining the masking effect of the noises was their temporal structure. The noise that was the most continuous with respect to frequency and time masked the beluga vocalization most effectively, whereas sounds (for example, natural icebreaking noise) that occurred in sharp pulses that left quiet bands in between and left gaps through which the beluga could detect pieces of the call. In a given environment, then, the impact of a noise on cetacean detection of signals likely would be influenced by both the frequency and the temporal characteristics of the noise, its signal-to-noise ratio, and by the same characteristics of other sounds occurring in the same vicinity (for example, a sound could be intermittent but contribute to masking if many intermittent noises were occurring).

In 1998, Erbe and Farmer (1998:1374) reported "There are no data on low-frequency directional hearing for odontocetes." Based on extrapolation from data from bottlenose dolphins evaluating directivity at high frequencies (an indirect method), the data indicated there is no directivity below 10 kilohertz.
It is not known whether (or which) marine mammals can (Erbe and Farmer, 1998) and do adapt their vocalizations to background noise. Humans adapt the loudness of their speech according to several factors, including the loudness of the ambient noise (French and Steinberg, 1947). Dahlheim (1987) reported that in noisy environments, gray whales increase the timing and level of their vocalizations and use more frequency-modulated signals.

McDonald, Hildebrand and Webb (1995) summarize that many baleen whales produce loud low-frequency sounds underwater a significant part of the time.

Most experiments have looked at the characteristics (for example, intensity, frequency) of sounds at which temporary threshold shift and permanent threshold shift occurred. However, it is not known what the impacts may be of repeated exposure to such sounds and whether the marine mammals would avoid such sounds after exposure even if the exposure was causing temporary or permanent hearing damage if they were sufficiently motivated to remain in the area (for example, because of a concentrated food resource). Whales often continue a certain activity (for example, feeding) even in the presence of airgun, drilling, or vessel sounds. Some people imply that such continuation indicates that the sound is not harmful to the cetacean. In many or all cases, this may be true. However, this type of interpretation is speculative. Whales, other marine mammals, and even humans, sometimes continue with important behaviors even in the presence of noise or other potentially harmful entities. Whales often fast for long lengths of time during the winter. The need to feed or to transit to feeding areas, for example, is possibly so great that they continue with the activity despite being harmed or bothered by the noise. For example, Native hunters reported to Huntington (2000) that beluga whales often ignore the approach of hunters when feeding, but at other times will attempt to avoid boats of hunters.

Potential Effects of Proposed Seismic Survey on Blue Whales, Sperm Whales, Right Whales, and Sei Whales

The location of the proposed seismic survey is well inside Cook Inlet. Thus, it is unlikely that there would be any major effect on any species that is not likely to occur in Cook Inlet or another body of water where sound from the survey might reasonably be expected to be detected. As we summarize in the affected environment section, available evidence indicates that blue, sperm, and North Pacific right whales do not typically breed, calve, feed, or migrate through areas were they could that would be likely to be exposed to noise or other potential adverse effectors associated with the proposed seismic survey in eastern Lower Cook Inlet. While blue, sperm and sei whales are seasonally present in the Gulf of Alaska, they are typically offshore. Blue whales are also relatively rare. North Pacific right whales also have observed within the last decade in the Gulf of Alaska. Any impacts on the health, reproduction or survival of individuals of this species would be significant because of their extremely small population size. As summarized elsewhere, this area clearly was an important part of their historic range. Right whales are extremely rare in this area, however. More importantly, there is no evidence indicating that North Pacific right whales ever inhabited areas within Cook Inlet or Shelikof Strait (see summary in National Marine Fisheries Service biological opinion for OCS Sale 88 in 1984 at the beginning of this section). Individual sei whales are very rarely observed in Shelikof Strait and waters adjacent to Kodiak Island. There is one recorded sighting of sei whales in the Cook Inlet program area. Thus, as with blue and sperm whales, it is unlikely that sei whales would be in areas impacted by any noise or disturbance associated with the seismic survey. It is possible, but based on the frequency of sightings, unlikely, that an individual or small number of sei whales could hear sounds associated with this survey if they happened to be in parts of Shelikof Strait or southern Cook Inlet. However, potential impacts of such noise detection are likely to be behavioral (for example, change of course) if any, transitory, and, given the rarity of their occurrence in the area, of negligible impact to the population.

Large land barriers separate areas where all of these species would be likely to occur and the area where the sound from this survey will be released. Thus, based on available information, we expect no impacts of the seismic survey on these four species because they do not tend to occur in areas where they could be impacted by airgun noise, other vessel-related noise, potential vessel strike, or discharges during the survey.

Potential Effects of the Seismic Survey on Humpback, Fin Whales

Noise associated with seismic exploration conducted in the lower inlet could affect the behavior of humpback and possibly fin, and less likely, beluga whales, potentially affecting the use of, or transit to, feeding areas. Humpback whales probably are the most likely of the ESA-listed baleen whales to be impacted by OCS oil and gas seismic activity in Cook Inlet. This is because they commonly occur seasonally in areas where seismic activity could occur; they may feed in areas where they could detect the seismic noise; and some segments of humpback populations have a demonstrated sensitivity to some types of noise associated with exploration.

Humpback whales make a variety of sounds. Their song is complex, with components ranging from less than 20 Hertz to 4 kilohertz, and occasionally up to 8 kilohertz (Richardson et al., 1995). Songs can be detected by hydrophones at distances up to at least 13-15 kilometers (Helweg et al., 1992). These songs can last as long as 30 minutes. However, they are typically heard on low-latitude wintering grounds. They occasionally have been heard on northern feeding grounds (for example, McSweeney et al., 1989). Thus, it is unlikely that noise associated with exploration or development would interfere with the hearing of this song. Most sounds produced by males in winter extend from 50 Hertz to greater than 10 kilohertz with most energy below 3 kilohertz (Silber, 1986). On high-latitude summer grounds, humpbacks are less vocal. Calls are made while feeding and may serve to manipulate prey and as "assembly calls" (Richardson et al., 1995). These calls are at about 20-2,000 Hertz.

McCauley et al. (2000) recently demonstrated that pods of humpback whales containing cows involved in resting behavior in key habitat were more sensitive to airgun noise than males and than pods of migrating humpbacks. In 16 approach trials carried out in Exmouth Gulf, off Australia, he found that pods of humpbacks with females consistently avoided a single (not an array) operating airgun at an average range of 1.3 km (McCauley et al., 2000). McCauley et al. (2000:692) summarized:

> The generalised response of migrating humpback whales to a three-dimensional seismic vessel was to take some avoidance maneuver at greater than 4 kilometers then to allow the seismic vessel to pass no closer than 3 kilometers. Humpback pods containing cows which were involved in resting behaviour in key habitat types, as opposed to migrating animals, were more sensitive and showed an avoidance response estimated at 7-12 kilometers from a large seismic source.

McCauley et al. (2000) observed a startle response in one instance. Within the key habitat areas where resting females and females and calves occurred, the humpbacks showed high levels of sensitivity to the airgun. The mean airgun level at which avoidance was observed was 140 decibels re 1 micropascal root mean square, the mean standoff range was 143 decibels re 1 micropascal root mean square, and the startle response was observed at 112 decibels re 1 micropascal root mean square. Standoff ranges were 1.22-4.4 kilometers. The levels of noise at which a response was observed are considerably less than those published for gray and for bowhead whales (see below). They were also less than those observed by McCauley et al. (2000) in observations made from the seismic vessel operating outside of the sensitive area where whales were migrating, not engaged in a sensitive activity.

McCauley et al. (2000) summarized that in their experience, cow/calf pairs are more likely to exhibit an avoidance response to a sound to which they are unaccustomed. They recommend that "…any management issues related to seismic surveys should consider the cow/calf responses as the defining limits" (McCauley et al., 2000:697). They also recommend that management decisions distinguish between whales that are in a "key habitat type" (McCauley et al., 2000:698) and those that are migrating through an area. They list areas used for feeding, resting, socializing, mating, calving, or other key purposes as "key habitats." While detailed data on the behavior of humpbacks in the areas discussed above are not available, many of the areas are known (for example, see Figure III.B-1 and Section III.B.1 - Lower Trophic-Level Organisms) to seasonally contain concentrations of phytoplankton, zooplankton, and associated zooplankton predators. They are important feeding areas for large numbers of birds, baleen whales, and Steller sea lions.

McCauley found that adult male humpbacks were much less sensitive to airgun noise than were females. At times, they approached the seismic vessel. McCauley et al. (2000) speculated that males that did so may have been attracted by the sound because of similarities between airgun sounds and breaching signals. Based on the aforementioned, it is likely that humpback whales feeding in areas within and adjacent to areas within the program area could have their movement and feeding behavior affected by noise associated with seismic exploration. It also is possible that female humpbacks also would show avoidance behavior to noise and disturbance activities associated with construction, drilling, and other noise generating aspects of exploration discussed above. The most likely to be impacted are females and calves. This potential impact would be seasonal, since humpbacks are not common in these areas during the winter.

Humpback whales near the seismic survey area could be negatively affected by vessel activity.

Available data indicate that fin whales also could, but are probably less likely than humpbacks to, be affected by noise and disturbance associated with seismic exploration in Lower Cook Inlet primarily because of their distribution. Based on available data, they do not occur as frequently or in as high abundance in areas within or directly adjacent to the Cook Inlet region. However, they occasionally are sighted in the inlet. They appear to be year-round inhabitants of Shelikof Strait and bays off of Kodiak and Shuyak islands, as well as bays across the strait along the Alaska Peninsula. Thus, small numbers of individuals could be affected by noises associated with seismic exploration. However, for both species, effects are likely to be limited to a few individuals and not affect the population as a whole.

Richardson et al. (1995) stated that the most common fin whale sound is a 20-Hertz sound that downsweeps from about 23 Hertz to about 18 Hertz over the course of about 1 second. The usual bandwidth is 3-4 Hertz (Payne and Webb, 1971). Calls believed to be from fin whales have been detected at distances of up to 185 kilometers (Cummings and Thompson, 1971) and can be detected at much greater ranges (D. Mellinger, cited as pers. commun. in Richardson et al., 1995). Richardson et al. (1995) summarized that fin whales also produce sound up to 150 Hertz.

Data are not available on responses of fin whales to airguns. Data are not available to determine whether airgun sounds produced within the program area would be detectable by fin or humpback whales in Shelikof Strait.

Richardson et al. (1995) reported that bowhead whale avoidance behavior has been observed in half of the animals when exposed to 115 decibels root mean square re 1 micropascal broadband drillship noises. However, reactions vary depending on the whale activity, noise characteristics, and the physical situation (Richardson and Greene, 1993).

Effects on Beluga Whales

Beluga whales may inhabit areas in which airgun noise, other noise, responses to the vessels, and potentially vessel strike could occur. However, available data (summarized in the affected environment section) indicates at present their use of such areas is low. National Marine Fisheries Service researchers (for example, Laidre et al., 2000; Moore et al., 2000; and Rugh, Shelden, and Mahoney, 2000) report that the current distribution of this stock appears to have contacted from its previous range and that sightings in the lower inlet currently are rare. Rugh, Shelden, and Mahoney (2000) reported that, since 1995, only one live and one dead beluga has been observed in areas south of the Forelands in the lower inlet during aerial surveys conducted in June and July. However, naturalists in the Homer area report seeing small numbers of belugas in August at the head of in Kachemak Bay in two successive recent years (Field, 2002, pers. commun.). The presence of a steelhead run into the Anchor River in the time period of the survey (e.g., Szaarzi and Begich, 2004) could attract belugas (whose distribution appears tied to prey availability) to areas near the survey.

We provide detailed information about potential beluga response to seismic surveys in our most recent EIS for this area (MMS, 2003). In that document, we concluded that beluga whales could be disturbed and their behavior modified due to noises associated with seismic exploration. Incidental to seismic surveys, high-frequency noise (across the bandwidth up to 22 kilohertz) is produced, which may overlap with frequencies used by toothed dolphins (Richardson et al., 1995). The Joint Nature Conservation Committee of the United Kingdom (Stone, 2001) reports there is some evidence of seismic survey disturbance of dolphins (Goold, 1996; Stone, 1997, 1998). The hearing of the beluga extends to at least as low as 40-75 Hertz, but their sensitivity at these low frequencies may be poor (summarized in Richardson et al., 1995). Turl (1993) concluded that if they are in the near field of an acoustic source, beluga may be more sensitive to some combination of low-frequency particle motion and pressure fluctuation than is evident from their relative insensitivity to low-frequency sounds at distance. Their high-frequency hearing is exceptionally good and they use high frequencies for echolocation. Thus, they are sensitive to high-frequency noise and they have a high need to have good sensitivity in the high-frequency ranges. Richardson et al. (1995) report that the hearing range of small- to moderate-sized toothed whales tested (including beluga) extended up to 80-150 kilohertz in some individuals of all tested species. Odontocetes have their best sensitivity in the middle frequency range where their hearing is very acute (for example, Figure 8.1 of Richardson et al. (1995) indicated that the underwater hearing of beluga ranged from about 30 Hertz to slightly over 100,000 Hertz. At about 15,000 Hertz, the hearing sensitivity of the beluga was exceptionally acute (approximately 39 decibels re 1 micropascal). Richardson et al. (1995) pointed out that the estimated auditory thresholds for many marine mammals may be too high for frequencies below 1-10 kilohertz. Using evoked potential methods, Klishin, Popov, and Supin (2000) found that like other odontocetes, the belugas audiogram is U-shaped with high sensitivities from 32 kilohertz to 108 kilohertz (less than 75 decibels re 1 micropascal) with the lowest threshold of 54.6 decibels at 54 kilohertz. This threshold is a few decibels higher than that found psychophysically.

Richardson et al. (1995:292) summarized that while most of the energy from airgun arrays is below 100 Hertz and, thus, below the frequencies of the optimum hearing and calls of toothed whales, the pulses often include energy up to 200-500 Hertz, and that "…despite the apparently poor low-frequency hearing of odontocetes, airgun pulses may often be audible to them out to a radius of 10-100 kilometers…."

Finneran et al. (2002) detected temporary shifts of 7 and 6 decibels in masked hearing threshold in a 32-year-old beluga whale at 0.4 and 30 kilohertz, respectively, about 2 minutes after exposure to a single underwater impulse (with peak pressures of 160 kilopascals, peak-to-peak pressures of 226 decibels re 1 micropascal, and total energy fluxes of 186 decibels re 1 micropascal squared second) from a seismic watergun (note: not an airgun). These thresholds returned to within 2 decibels of the pre-exposure value within 4 minutes of exposure. Finneran et al. (2002) reported that they used waterguns instead of airguns, because watergun impulses contain more energy at higher frequencies where odontocete hearing thresholds are relatively low. They noted that a 6-decibel criterion for defining a temporary shift in masked hearing threshold was considered, based on previous threshold data on the animals, to be the minimum shift that was clearly larger than day-to-day or session-to-session levels of variability. Finneran et al. (2002) also noted that the presence of masking noise may result in elevated hearing thresholds (as it does in humans) and, thus, that it is possible that lacking the masking noise, a larger temporary threshold shift would have been detected. With the masking noise present, no temporary shift in masked hearing threshold was detected at a peak pressure of 207 kilopascals (30 pounds per square inch) in a 36-year-old bottlenose dolphin. Keeping in mind the caveat of the masking noise, in bottlenose dolphins, no temporary shift in masked hearing threshold was detected at the highest exposure conditions. Finneran et al. (2002) compared the results of their study to those of previous studies. Au et al. (1999) reported a 12-18 decibel temporary-threshold shift in a bottlenose dolphin exposed to 50 minutes of octave band noise centered at 7.5 kilohertz. Finneran et al. (2000) showed no temporary shift in masked hearing thresholds after exposure to single impulses, and Schlundt et al. (2000) found temporary shift in masked-hearing thresholds of 6 decibels or larger in belugas and dolphins exposed to 1 second oureLisa tones between 3 and 75 kilohertz. Finneran et al. (2002) concluded that the use of a single sound-pressure level, without regard to signal duration, is an inappropriate metric to predict or describe a temporary threshold shift in hearing.

Beluga whales also can be negatively affected by noise associated with ships and high-speed motorboats. Beluga whales have exhibited avoidance behaviors at ship noise levels of only 94-1-5 decibels root mean square re 1 micropascal in the 20-1,000-Hertz band from ships 35-50 kilometers distant (Finley et al., 1990). Belugas have been observed to immediately move downriver away from, and in response to, outboard motor noise (Stewart, Aubrey, and Evans, 1983). Belugas have been observed to startle and leave the area in response to boats and barges transiting in a whale concentration area (Fraker, Sergeant, and Hoek, 1978). Three vessels will be involved in this seismic survey. We assume that small boat transit, most likely from Homer, will be required daily or periodically in support of the operation. Belugas may exhibit relatively localized avoidance of the area where the vessels are operating, both to avoid the seismic noise and to avoid other associated noise.

It is sometimes implied that the failure of a whale to modify its behavior, especially when feeding, is evidence that the whales is not significantly affected by the noise. This may be true in some or all cases. However, it also is possible that whales that are engaged in an especially critical behavior, such as seasonal feeding, may be sufficiently motivated to be in an area that they remain despite the noise, even if the noise is masking communication, temporarily damaging hearing capabilities, or interfering with the detection of other important sounds. Whales may remain in an area even though a clearly harmful factor is present. For example, Native hunters in Cook Inlet have reported that while belugas generally have become more wary in Cook Inlet when feeding in shallow water, they ignore a hunter's approach (Huntington, 2000).

While other factors may have contributed, there is no evidence linking noise and disturbance from OCS oil and gas activity, or noise and disturbance from oil and gas development in State waters to the recent decline. The fact that prior to overhunting, beluga whales in Cook Inlet coexisted in the inlet with oil and gas exploration activity with no obvious ill effects suggests it is unlikely that relatively small amounts of additional exploration during the early to late autumn in areas outside of the current primary use zones of this population will cause significant negative impacts on this population.

Effects of the seismic Survey on Steller Sea Lions

The effect of seismic noise on Steller sea lions is not well studied. Audiograms are not available for Steller sea lions, but behavioral audiograms are available for the California sea lion and the northern fur seal. Richardson et al. (1995) report that pinnipeds tend to have lower best frequencies, lower high-frequency cutoffs, and poorer sensitivity at the best frequencies, than do odontocetes. The high-frequency cutoff for the two otariid seal species studied was 36-40 kilohertz (Schussterman 1981a) and their sensitivity at low frequencies was intermediate. The California sea lion had best sensitivity of about 80 decibels at 2 and 16 kilohertz. Sensitivity at 100 Hertz was 116-120 decibels and about 85 decibels at 1 kilohertz. Sensitivities in air are about 32-36 Hertz. The in-air sensitivity of pinnipeds apparently decreases as frequency decreases below 2 kilohertz (Richardson et al., 1995).

Pinniped reaction to airgun noise is highly variable, ranging from approach to avoidance (see summary in LGL and LGL (2005). The National Marine Fisheries Service (67 *FR* 35793) reported that seals and sea lions are believed to be less likely to be harmed by underwater noise than cetaceans, and they have been observed swimming in the bubbles of large seismic airgun arrays. The National Marine Fisheries Service states (67 *FR* 35793) that it has been determined through scientific workshops that pinnipeds would need to be closer than 190 decibels (root mean square) before injury.

There are recent data indicating that noise from seismic exploration may influence the behavior of Steller sea lions when they are in the water. A recent radio-telemetry study in the United Kingdom indicate that harbor and grey seals exposed to airgun noise demonstrated short term changes in behavior (see discussion in LGL and LGL, 2005). Sighting distances for harbor seals and California lions were greater when airguns were firing than when they were not (see LGL and LGL, 2005). Based on available information, it is unlikely that Steller sea lions would be physically harmed by seismic-survey operations. However, behavioral displacement from specific sites could occur. Critical habitat of Steller sea lions is unlikely to be impacted by these seismic surveys because of their distance from the seismic survey area.

Effects of Exploration on the Southwest Alaska Stock of Sea Otters

Oil and gas seismic exploration in the area near Anchor point is not likely to have any impacts on the Southwest Alaska stock of sea otters because of its distance from their geographic range.

Based on information provided by the Fish and Wildlife Service in comments on a draft of the EIS, "…GIS analysis suggests that the geographic overlap between the proposed lease sale area and sea otters from the southwest Alaska" Distinct Population Segment "is minimal." They reported that during a survey conducted by the U.S. Geological Survey, Biological Resources Division

> …the high-density survey stratum covered 3,968 km^2 if sea otter habitat adjacent to lower western Cook Inlet from Cape Douglas in the south, northward to latitude 59º58'21." While approximately 35 percent of this survey stratum…lies within the boundaries of the proposed Cook Inlet lease sale area, few sea otters were observed there. For the entire lower western Cook Inlet survey area, observers recorded …a total of 544 otters, but only a single otter was recorded within the proposed lease sale area. The vast majority of sea otter sightings occurred southwest of Augustine Island." However, it is unclear from the available information whether this observed distribution tends to change significantly with season, between years, based on weather patterns, or due to other factors.

Mitigations

The proposed action includes required mitigations to minimize potential impacts on marine mammals (see Section III.A and III.B). These mitigations should reduce the possibility of both physiological and or behavioral effects on marine mammals that are detected. Because of the timing of the survey, a limiting factor for many of the mitigation measures will be the ability to detect marine mammals. During most of the period of the survey, it will be dark over half the time of operation. Additionally, even during daylight periods, it is likely that rough seas, low light, and inclement weather will greatly reduce the ability of observers to effectively monitor areas surrounding the seismic vessel. Thus the mitigation may require delay of surveying until effective monitoring can be accomplished or the addition of aircraft observation.

B. Effects on Other Marine and Coastal Birds.

The most numerous species groups occupying lower Cook Inlet in winter are waterfowl, alcids, gulls, and cormorants (Agler et al., 1995; Arneson, 1980). During the February surveys of Agler et al., gulls, scoters, long-tailed ducks, eiders, murres, guillemots, cormorants, and murrelets were the most abundant species groups within the proposed seismic survey area. A majority of cormorants, long-tailed ducks, and scoters were occupying nearshore waters within about 5 km of shore. The other species were more scattered in distribution, from nearshore to offshore waters.

Marine and coastal birds that are not covered by the ESA are likely to experience only minimal population-level effects from displacement, collisions, or seismic impulses for the same reasons as discussed for species covered by the ESA.

C. Effects on Other Marine Mammals.

Species that might be in the survey area during autumn include harbor seals, sea otters, and Dall's porpoises (USDOI, MMS, 2003:Sec. III.B.6). The probability of the proposed seismic survey activities disturbing nonendangered marine mammals is very low. The sound associated with the proposed seismic survey probably is not the loudest to which Cook Inlet marine mammals would be exposed, according to an underwater acoustic study by Blackwell and Greene (2002). The authors determined that the loudest underwater noise occurred during aircraft overflights seaward of Anchorage International Airport and Elmendorf Air Force Base. Marine mammals near the proposed seismic and vessel activity might respond to the airgun and vessel noises with startle response. As with the startle responses to other vessel traffic, the responses to the seismic vessels and survey noise are likely to be brief; and the affected animals are likely to return to normal behavior patterns within hours. Any effects on other marine mammals would be moderated by the proposed operating conditions and our suggested modifications of the conditions.

D. Effects on Fish Resources, Essential Fish Habitat, and Other Resources.

Potential impacts to fish resources and Essential Fish Habitat (EFH) from seismic surveys using airguns are assessed in the Cook Inlet Lease Sale 191 and 199 Final EIS (USDOI, MMS, 2003); the assessment is incorporated by reference.

Seismic surveys using airguns can disturb and displace fishes and interrupt feeding (Pearson, Skalski, and Malme, 1992), although information suggests that displacement may vary among species (for example, demersal versus pelagic species). Studies suggest that some pelagic or nomadic fishes leave the survey area during seismic surveys (Engas et al., 1996, 1993; Lokkeborg and Soldal, 1993). The areas apparently affected extended up to 33 km from the survey center.

Popper et al. (2005) investigated the effects of exposure to a 730 in^3 airgun array on the hearing of three fish species in the Mackenzie River Delta—the northern pike (*Esox lucius*), broad whitefish (*Coregonus nasus*), and lake chub (*Couesius plumbeus*). Threshold shifts were found for exposed fish as compared to controls in the northern pike and lake chub, with recovery within 24 hours of exposure; there was no threshold shift in the broad whitefish. This study was designed to investigate hearing impacts from an airgun array used to survey a riverine system; similar hearing impacts from an airgun array used offshore are not necessarily similar due to important differences in survey methodology, acoustic properties, and species present.

Fishes exposed to an operating airgun may sustain extensive damage to their auditory hair cells (McCauley, Fewtrell, and Popper, 2003), thereby likely impacting their hearing adversely. Fishes with impaired hearing temporarily may have reduced fitness, may be more vulnerable to predators, may be less successful at locating prey and sensing their acoustic environment, and/or, in the case of vocal fishes, may be unable to communicate with other fishes. Some fishes exposed to airgun emissions have been observed to display aberrant and disoriented swimming behavior, suggesting that damage to the ears also may have vestibular impacts (McCauley, Fewtrell, and Popper, 2003). There is some evidence indicating that seismic survey acoustic-energy sources damage eggs and fry of some fishes. This harm apparently is limited to within 1 or 2 m from the airgun-discharge ports.

The effects of the proposed seismic survey to fish populations in the proposed survey area and adjacent waters likely would be very low and temporary. The seismic survey may displace temporarily the pelagic fishes from the proximate area where airguns are in use. Fishes displaced and avoiding the airgun noise are likely to backfill the surveyed area in a matter of minutes to hours. Fish resources not dispersing from the airgun noise (e.g., demersal species) may startle and move short distances to avoid airgun emissions. Fishes of any lifestage in close proximity to airgun emissions may suffer auditory or vestibular harm that reduce individual fitness, fecundity, or survival. However, populations of managed-fish species are believed to be at their lowest in the survey area during autumn, and smolt/juvenile fishes have moved out to deeper waters (Lance, 2005, pers. commun.). Therefore, autumn is the least damaging time of year on EFH for the conduct of the proposed seismic survey (Lance, 2005, pers. commun.).

The proposed seismic survey would have negligible effects on other resources, including benthic organisms, subsistence, public lands, historic places, and other unique characteristics (USDOI, MMS, 2003).

E. Cumulative Effects.

As noted, an additional seismic survey is proposed for the adjacent, inshore State water during the September 5 to November 15 period. The airgun vessels for the OCS survey also would be used for the State portion of the survey, i.e., there would not be two simultaneous seismic surveys. As explained in Section IV.A, Steller's eiders migrate into the proposed survey region, and especially into the nearshore (State) portion, during November. Any effects on Steller's eiders could be reduced by early completion of the seismic transects in nearshore (State) waters. The proposed survey of Federal waters would not be related to other actions with cumulatively significant affects.

Conclusions. The ESA-covered Steller's eiders have been observed near the proposed survey area during winter; however, they probably would arrive in the survey area after the period of operation and would be concentrated inshore of the Federal waters. Thus, there is minimal likelihood of adverse effects occurring. Regarding ESA-covered marine mammals, most likely there would be no take because of the distance between the proposed survey area and their main habitats near the southern edge of Cook Inlet, and also because of the proposed timing of the survey (autumn) and relatively shallow water in the proposed survey area (less than 46 m). If they did occur in the survey area, the operating conditions that are proposed by Veritas would moderate any effect. Other marine and coastal birds are likely to experience only minimal population-level effects. There is no evidence that seismic survey activity proposed for the limited area and duration at this location would affect other marine mammals; however, a few isolated harbor seals, sea otters, Dall's porpoises, and/or beluga whales might be located in the proposed seismic survey during the autumn. The effects of the proposed seismic survey to fish populations and fishing in the proposed survey area and adjacent waters would likely be very low and temporary, and the populations of managed-fish species are believed to be at their lowest in the survey area during autumn. Thus, there would be no significant cumulative effects.

Cumulative Effects on Endangered and Threatened Marine Mammals

Summary

We do not expect a significant cumulative effect on threatened and endangered marine mammals associated with the proposed seismic survey by Veritas in Lower Cook Inlet. The incremental effect added to other cumulative effects would be extremely small.

However, the significance of potential cumulative effects on especially beluga whales and Steller sea lions, and, to a lesser extent, humpback whales and fin whales is uncertain. Common past, current, and predicted human-related factors that have impacted, and could again adversely impact, some or all of the threatened and endangered species and the beluga whale include:

- marine and terrestrial habitat contamination with harmful contaminants;
- habitat loss and degradation at important feeding, nursery, and other habitats due to increased noise, disturbance, and alteration related to human settlement, development, and activities such as fishing, mariculture, and tourism;
- human-related and other changes in the size and composition of marine fish populations;
- human harvest;

- take associated with commercial fishing; and
- global warming.

Pollution of marine and terrestrial habitats occupied by these species occurs from many human-related sources, such as sewage inputs, petroleum hydrocarbons from sources related to oil use and oil spills, contaminants from industrial and agricultural activities, and many other sources. Long-distance transport of contaminants can occur. Persistent organochlorine contamination may pose a particular threat to threatened and endangered marine mammal populations. .

It is unlikely that cetaceans other than the Cook Inlet beluga whale have been exposed to adverse effectors associated with State oil and gas leasing in the inlet. No serious adverse effects from this activity have been identified on beluga whales. Available data do not indicate previous OCS oil- and gas-related adverse effects on the cetacean stocks that could be affected by the proposed seismic surveys.

The impacts of increased noise in the marine environment on the species at issue are mostly unknown but potentially could have adverse effects such as disruption of communication and avoidance of important habitats. Many of the threatened and endangered species are known to have suffered mortality related to commercial-fishing operations (from entanglement in derelict or active fishing gear and, in some cases, intentional killing associated with the fishing operations of sea lions). Such take still may be occurring. However, in most cases, information is insufficient to make firm conclusions about levels of take. All of the threatened, endangered species of marine mammals, as well as Cook Inlet beluga whales have suffered serious adverse effects from intentional killing by humans. This overexploitation of these stocks reduced population size, disrupted historic population structures, reduced historic distributions, could have led (in many cases) to loss of genetic variability within populations and, in the case of the species of interest here, is the primary or one of several primary factor(s) leading to the current ESA status of the marine mammal species or population. With the exception of high levels of intentional killing, all of the aforementioned sources of adverse effects still exist. Sea lions are still hunted. The take of beluga whales in Cook Inlet is now regulated and the harvest very small. Global warming could impact some of the threatened and endangered species of concern here if such warming resulted in changes in prey or predator distribution, abundance, or both. There is considerable uncertainty about the extent to which all of the aforementioned factors may interact to modify or degrade the marine environment and, thus, to cause potentially long-term adverse effects on the species considered here.

We expect potential incremental cumulative effects attributable to the proposed seismic survey to be insignificant for all species of threatened and endangered marine mammals that inhabit Cook Inlet: we did not evaluate cumulative effects for blue whales, sperm whales, sei whales, or North Pacific right whales.

In the absence of a very large oil spill, we would expect any incremental effects attributable to proposed Sale 191 to be insignificant for all of the aforementioned species, all ESA-listed and candidate cetaceans, for the eastern population stock of Steller’s sea lions, for Steller’s eiders, and for the southwest Alaska stock of sea otters.

The primary potential for incremental contributions to cumulative adverse effects on threatened and endangered marine mammals from the proposed seismic survey could result from temporary incremental increases in noise and disturbance that may cause especially beluga whales and Steller sea lions to interrupt feeding and potentially to lose feeding time and to lose prey. We believe this potential effect is unlikely because, absence observations that require shut-down, the full array will only be firing during slack tide. Unless the prey availability corresponds tightly to this period, these species could return even within the day. Key western Steller sea lion stock terrestrial and foraging critical habitats and other habitats that resulted in Steller sea lions avoiding important feeding habitats or to direct mortality. Any large displacement, particularly of juvenile Steller sea lions, from important foraging habitats could result in a significant cumulative adverse effect on this species. Any such displacement from marine critical habitats could result in a significant adverse cumulative effect on that critical habitat. Displacement from important feeding habitats would not have to be years in duration to have a potentially significant cumulative effect, especially if juveniles were displaced. Such a cumulative effect is considered unlikely from routine operations, unless Steller sea lions avoided important foraging areas due to noise or other disturbing activities that occurred within or very near their critical habitats. Any disturbance of the western population stock of Steller sea lions at their terrestrial critical habitats that resulted in mortality (for example, due to trampling) could result in a potentially significant negative adverse effect on both the western population stock of Steller sea lions and on that critical habitat. Any potential increase in mortality of Steller sea lion prey species in sea lion critical habitat that resulted in a large decrease in prey available to the western stock of Steller sea lions could result in a potentially significant cumulative effect on both the stock and on the critical habitat. Such a significant effect on prey probably is possible only in the unlikely event of a large or very large oil spill that contacted critical habitat or other important feeding areas and reduced availability of Steller sea lion prey. Such a large or very large spill also conceivably could result in a significant cumulative effect if it resulted in the exposure to large amounts of fresh crude oil by Steller sea lions, particularly if it resulted in the oiling of pups.

In the unlikely occurrence of a large oil spill, the incremental impact on the Southwest Alaska population of sea otters, and less likely on the American breeding population of Steller's eiders, could result in a significant cumulative effect on these two populations. There is a small possibility that a large or very large oil spill that occurred in the upper part of Cook Inlet could result in a significant cumulative effect on the Cook Inlet stock of beluga whales, if such a spill occurred. However, existing data indicate that such an effect would be unlikely.

The primary substantive change in this document that modifies our evaluation of cumulative effects in the Cook Inlet Multiple-Sale EIS is the following. At the time we wrote the multiple-sale EIS, evidence indicated that the western population of Steller sea lions was in continued decline. We noted that it was difficult to assume that this population could withstand any additional adverse effects and be expected to recover since it was already not recovering, and apparently not able to withstand those natural and human-caused adverse impacts already affecting it. As described in the affected environment section, recent surveys indicate that this population is not still declining. While data are insufficient to establish whether there is a true upward trend, cumulative effects are not currently causing population decline.

In contrast, at the time of the Cook Inlet Multi-Sale EIS, we assumed that because the subsistence harvest was now being regulated that beluga whales would begin to recover. There is not evidence of such a recovery. NMFS has concluded there may be other factors affecting recovery. Thus, we no longer assume that this population can recover, should additional incremental effects be added to those cumulative effects already impacting this population.

The cumulative effects on many of the threatened and endangered species that can occur within or near the proposed survey area is somewhat uncertain, because basic knowledge of the population structure, population identity, migration routes, and other key life-history information is uncertain or unknown for some of these species. For example, for most of the whale species, we do not know where population boundaries lie. For this reason, population estimates and population trends are, for many species, unclear or known. For this reason also, it is not always clear what human-related impacts there are on a particular population, what the magnitude of the impacts are and, most importantly, whether such potential impacts (for example, death or injury due to fishing-gear entanglement or contaminant exposure) are having a significant effect on the population. Because of the aforementioned, the cumulative effects on a population and the significance of any potential negative contribution from the Proposed Action are, in some cases, difficult to assess.

With respect to large cetaceans, it often is difficult to determine the cumulative impacts, because the whales are out at sea and adverse impacts are typically not observed. For example, with respect to the recorded levels of impacts of fishing-gear entanglement on fin (and sei) whales, Reeves, Silber, and Payne (1998:29) caution:

> …Heyning and Lewis (1990) suggested that most whales killed by offshore fishing gear do not drift far enough to strand on beaches or to be detected floating in the nearshore corridor…Thus, the small amount of documentation should not be interpreted to mean that entanglement in fishing gear are insignificant causes of mortality. Observer coverage in the Pacific offshore fisheries has been too low for any confident assessment of species-specific entanglement rates (Barlow et al., 1997). Fin and sei whales may break through or carry away fishing gear. Whales carrying gear may later die, become debilitated or seriously injured, or have normal functions impaired, with no evidence recorded.

This statement, while directed at effects on whales from fisheries, is true for interpretation of impacts from many factors including impacts of prey removal in fisheries, exposure to petroleum hydrocarbons or other contaminants especially at sea, exposure to noise, and hunting. With respect to the latter, information that has just recently emerged about the impacts of previous illegal Soviet whaling (for example, on North Pacific right whales) and from studies indicating other illegal take of protected cetaceans, indicates that the available information about takes may not be complete or even reliable.

However, it is clear that common past, present, and predicted human impacts affect many of the marine mammals that inhabit the Cook Inlet and Gulf of Alaska regions.

Contaminants

Marine mammals that inhabit arctic and subarctic waters of the North Pacific, including Cook Inlet, may be affected by low levels of contaminants. These toxins become concentrated in tissues of species near the top of the food chain. For example, available data indicate that arctic and nearby oceanic waters serve as a sink for persistent contaminants, many of which are used in low-latitude developing countries. Tanabe, Iwata, and Tatsukawa (1994) concluded that marine mammals, particularly cetaceans, are one of the animal groups receiving high concentrations of one class of such contaminants, persistent organochlorines. Tanabe, Iwata, and Tatsukawa (1994) concluded that marine mammals amplify great amounts of these contaminants through feeding and pass them from one generation to the next through lactation. These authors reported that, due to specific enzyme systems, marine mammals have a smaller capacity than many other types of animals for degrading such contaminants. They concluded:

> …the residue level of these contaminants in marine mammals are unlikely to degrade in the near future….it may be concluded that marine mammals are one of the most vulnerable and possible target organisms with regard to long-term toxicity of hazardous man-made chemical in the future.

O’Shea and Brownell (1994) found that organochlorine contaminant levels in baleen whales was relatively low compared to other marine mammals, and that detected levels provided no reason to suspect that exposure has caused either direct lethality or impaired reproduction in baleen whales. However, they pointed out that, at the time of their review, no thorough study of potential impacts of contaminants existed for any species of baleen whale.

Reported effects of organochlorines include immunotoxicity, hepatotoxicity, neurotoxicity, reproductive and hormonal effects, abnormal effects on metabolism, mutagenesis and carcinogenesis, and/or skin lesions (Safe, 1984) in species such as dolphins in the Mediterranean (Poster and Simmonds, 1992)’ seals in the North and Baltic seas (Heide-Jørgensen et al., 1992); St. Lawrence estuarine beluga whales (Martineau et al., 1987); and fish-eating birds (Kubiak et al., 1989).

In pinnipeds, organochlorines have been associated with reproductive failures of seals in the Dutch Wadden Sea and elsewhere (Hutchinson and Simmonds, 1994). In the American mink *(Mustela vison*), a species relatively closely related to sea otters, reproduction was inhibited at very low polychlorinated biphenyl intake (den Boer, 1983). In monkeys and other species, polychlorinated biphenyl exposures were found to have negative effects on birth weights, conception rates, and live birth rates. The effects of polychlorinated biphenyl exposure on reproduction and related factors are likely to be long lasting. Effects in monkeys were observed long after the dosing with polychlorinated biphenyls occurred. Sperm counts were reduced in rats exposed to polychlorinated biphenyls (Environmental Protection Agency, Office of Pollution Prevention and Toxics web site).

Polychlorinated biphenyls also have important potential impacts on survival rates of all age classes of marine mammals, due to their impacts on the immune system and their potential to predispose individuals with high contaminant loads to infectious disease.

Chemicals such as polychlorinated biphenyls, polychlorinated dibenzo-p-dioxins (PCDD’s), and polychlorinated dibenzofurans (PCDF’s) have been found to be immunotoxic at low doses in studies of laboratory animals, and to accumulate in the tissues of higher trophic marine mammals such as seals (Van Loveren et al., 2000). Van Loveren et al. (2000:319) concluded:

> …that complex mixtures of environmental contaminants including polychlorinated biphenyls, PCDFs, and PCDDs may represent a real immunotoxic risk to free-ranging seals.

Coplanar polychlorinated biphenyls have been associated with mass mortalities of seals in the North Sea and Lake Baikal, epizootics in Mediterranean striped dolphin, and embryonic abnormalities in Great Lakes waterbirds (Tanabe, Iwata, and Tatsukawa, 1994). Some investigators have suggested that the primary lesion of the adrenals, one of a combination of lesions found in Baltic grey and ringed seals as a disease complex, may be caused by organochlorines, specifically by polychlorinated biphenyls (Bergman and Olsson, 1986; Olsson, Karlsson, and Ahnland, 1994). Findings from studies of potential associations between chronic exposure to polychlorinated biphenyls and infectious disease mortality in harbor porpoises from England and Wales were "…consistent with the hypothesis that chronic polychlorinated biphenyl exposure predisposes harbour porpoises in United Kingdom waters to infectious disease mortality…." (Jepson et al., 1999:243). Tanabe, Iwata, and Tatsukawa (1994:172) concluded:

> …the present status of contamination by organochlorines in the marine ecosystems has also reached the critical point which might be enough to cause the induction of P-450 enzymes and disturbance of enbiotics in organisms…such as marine mammals.

Studies summarized by the Environmental Protection Agency (Office of Pollution Prevention and Toxics Studies) document many serious impacts of polychlorinated biphenyl exposure on the immune system of monkeys and other animals. These impacts include: (1) a significant decrease in size of the thymus gland (a gland critical to the functioning of the immune system) in infant monkeys; (2) reduced responses of the immune system following a standard laboratory test that determines the ability of an animal to mount a primary antibody response and develop protective immunity; and (3) decreased resistance to viral and other infections. The Environmental Protection Agency writes: "Individuals with diseases of the immune system may be more susceptible to pneumonia and viral infections. The animal studies were not able to identify a level of polychlorinated biphenyl exposure that did not cause effects on the immune system."

There also is "…overwhelming evidence that polychlorinated biphenyls cause cancer in animals…The reassessment…concluded that the types of polychlorinated biphenyls likely to be bioaccumulated in fish and bound to sediments are the most carcinogenic polychlorinated biphenyl mixtures" (Environmental Protection Agency, Office of Pollution Prevention and Toxics web site).

Noise and Disturbance

Noise and disturbance in the marine environment may have major cumulative impacts on marine mammals and especially cetaceans. Significant and increasing sources of noise and disturbance include, but are not limited to (a) noise from shipping (for example, tankers, icebreaking ships, barges, tour ships, factory trawlers); (b) other vessel traffic (for example, smaller fishing boats, high-speed motorboats, float planes); (c) low-frequency active sonar used by the military to detect "silent" submarines; (d) seismic surveys; (e) underwater explosions related to construction, mineral mining, and military activities; (f) oil rigs; and (g) other construction.

Disturbance is possible from all of the aforementioned. In addition, disturbance to nearshore marine mammal populations comes from mariculture sites, human settlements, tour operations, dredging, harbor construction, commercial and sport fisheries, and many other sources.

Shifts in Composition of Marine Fish Stocks

Changes in the composition of fish stocks, in some cases possibly driven by (Hatch and Piatt, 1995), explosive growth and changes in commercial fisheries in the northeastern Pacific, correspond to declines in certain seabird species and Steller sea lions in the Gulf of Alaska (Merrick, Loughlin, and Calkins, 1987; Pitcher, 1990). For example, in the Gulf of Alaska, a shift occurred in the late 1970's and early 1980's toward increased abundance of walleye pollock, cod, and various flatfishes. This increased abundance occurred possibly at the expense of (Alverson, 1992) other species that are prey for a number of threatened and endangered species in the Gulf of Alaska regions (for example, Steller sea lions), including herring, sand lance, and capelin. Piatt (unpublished data, cited in Hatch and Piatt, 1995) found that the diets of some seabird species, including murrelets, shifted from being primarily capelin based to being primarily pollock based coincident with the change in relative abundance of the fish species. Hatch and Piatt (1995) stated: "The wholesale removal of large quantities of fish biomass form the ocean is likely to have major, if poorly known, effects on the marine ecosystem. An emerging issue is whether fish harvests are altering marine ecosystems to the detriment of seabirds and other consumers like pinnipeds and whales."

Except for the Cook Inlet beluga whale, the other cetaceans discussed here are unlikely to have been exposed to adverse impacts of State oil and gas leasing. State sale areas generally have been confined to waters north of Kachemak Bay. Fin whales are not common in the upper Inlet. The other threatened and endangered cetaceans, except for humpback whales, tend not to go into the Inlet at all. Humpback whales rarely venture past Kachemak Bay. The National Marine Fisheries Service (1993) summarized that the six species of large endangered whales considered here are less exposed to OCS activities in other areas than is the previously listed gray whale.

All of the cetaceans discussed here are endangered or in their current depleted state because of direct and purposeful take by humans. Commercial harvest of all species of humpback whales and fin whales had substantial adverse effects on the affected species. All of the species of great whale are now protected from whaling, but undocumented levels of illegal take have occurred at least as recently as the late 1990's (for example, see Baker et al., 2000). The Cook Inlet beluga whale recently suffered overexploitation by Alaskan Natives (for example, see Mahoney and Shelden, 2000; NMFS, 2005). Available information regarding estimates of pre-exploitation size is presented in the affected environment section.

The great whales also are subject to adverse effects of ecosystem degradation. In a recent review of cetacean vulnerability to ecosystem degradation, Clapham and Brownell (1999:4) derived probable criteria to classify cetaceans with regard to their likely vulnerability to ecosystem degradation:

> Criteria…primarily involve the rarity of the animal and whether its distribution is commonly coastal. Those species which we do not consider vulnerable are those which feed or breed in offshore waters that are largely undisturbed by human development or activity. Populations which appear to be large (irrespective of their migratory habits) are also unlikely to be vulnerable….

Clapham and Brownell (1999:1) summarized that whales that feed, breed, or migrate through coastal waters are those that are most likely to be vulnerable to ecosystem degradation.

> Types of degradation include heavy ship traffic (resulting in collisions or behavioral disturbance), fisheries operations (leading to entanglement and perhaps depletion of prey…), disturbance from tourism, industrial activity (notably oil and gas development), direct exploitation, coastal development and pollution.

Cetaceans and other marine mammals also can be adversely impacted by commercial fisheries. Primary pathways of impact for commercial-fishing operations on ESA-listed whales include incidental take and entanglement in actively fishing and discarded gear, shooting during fishing operations (this tends to be a problem for toothed but not baleen whales), effects on prey abundance, and disturbance. Known current rates of entanglement, direct take, and incidental take of population stocks of great whale in the North Pacific are low. Thus, the National Marine Fisheries Service (2001b:4-216) found that "…the cumulative effect of take and entanglement is found to be cumulative but considered insignificant to all of the great whale species that occur in the BSAI and GOA [Gulf of Alaska]." The National Marine Fisheries Service (2001b) did not identify direct or indirect effects of groundfish fisheries on the prey of great whales and, therefore, did not identify a cumulative effect on prey abundance for these whale species. Lastly, the National Marine Fisheries Service (2001b) concluded that there were past external effects of disturbance from foreign/joint venture fisheries, other fisheries, and subsistence and commercial harvest on great whales throughout their range. Present and predicted effects of disturbance are similar.

Read and Wade (2000:933) concluded the following with regard to the state of knowledge of the take of cetaceans and pinnipeds in set and drift gillnet fisheries relative to the Potential Biological Removal for the stock:

> Because so few fisheries have been monitored in Alaska, we do not know the magnitude of these takes. Therefore, although only a few stocks in Alaska had takes greater than PBR [Potential Biological Removal], this result should be considered uncertain pending observations of the many category II gill-net fisheries in that area.

None of the threatened and endangered species of cetaceans considered here are known to have suffered harm from the 1989 *Exxon Valdez* oil spill, or from previous spills in Cook Inlet, such as the *Glacier Bay* oil spill.

Cumulative Effects on Cook Inlet Beluga Whales

In the Draft Conservation Plan, NMFS (2005) provides a detailed review and discussion of potential human-related factors that could be impacting the recovery of the Cook Inlet beluga whale. They evaluated factors including subsistence harvest, noise, coastal development, tourism and whale watching, vessel traffic, and pollution. Moore et al. (2000) also provided a detailed review of potential human caused impacts on Cook Inlet beluga whales and their habitat. Human activities that were identified as of concern to the Cook Inlet beluga stock included commercial fishing, oil and gas development, municipal discharges, noise from aircraft and ships, shipping traffic, and tourism.

In October of 2000, the National Marine Fisheries Service (2000:38) examined "…all factors that have been identified that may contribute to the cumulative impact on the …stock, and its habitat in the Inlet." These factors included subsistence harvest; natural mortality due to strandings, predation and disease; prey availability in Cook Inlet; potential interaction with State fisheries in Cook Inlet; oil and gas development in the Inlet and adjacent lands; municipal activities; commercial-vessel traffic; impacts from noise; and potential impacts from National Marine Fisheries Service research activities. We refer readers to the aforementioned document (National Marine Fisheries Service, 2000) for details on potential cumulative impacts to Cook Inlet belugas that are beyond the scope of this document.

The National Marine Fisheries Service (2000:1-2) summarized that:

> A review of the natural and anthropogenic factors potentially impacting the stock of CI beluga whales indicates that subsistence harvest is the most likely cause of the decline observed between 1994 and 1998…The impacts of other anthropogenic factors of CI beluga whales were also considered. No current population-level effects are thought to be occurring due to man-induced factors except for the harvests. The upper Cook Inlet region is important habitat to this stock, and NMFS believes that the potential pressures from activities need continued monitoring with the recovery of the beluga whales in mind. However, with the exception of the subsistence harvest, none of the other identified activities can be directly linked to the recent decline in CI beluga whales, nor does any of the information available support a deleterious impact on the health of the beluga whales or any impact that would inhibit the recovery of the whales.

In 2001, the National Marine Fisheries Service (Angliss, DeMaster, and Lopez, 2001:87) summarized that

> …no indication currently exists that these activities have had a quantifiable adverse impact on the beluga population. The best available information indicates that these activities, alone or cumulatively, have not caused the stock to be in endangered of extinction (June 22, 2000, 65 FR 38778; Draft Environmental Impact Statement on Federal Actions Associated With the Management and Recovery of Cook Inlet Beluga Whales, October 2000, Alaska Regional Office, National Marine Fisheries Service….

The National Marine Fisheries Service (Angliss, DeMaster, and Lopez, 2001) summarized that the stock may currently have heightened susceptibility to adverse impacts because of their currently reduced state and more restricted range.

The National Marine Fisheries Service (1999) summarized anthropogenic impacts on Cook Inlet. Fishing bycatch was considered low in all regions of Cook Inlet. Oil and gas potential impacts were categorized as high for the west sides of the "low" and "moderate" summer use areas and low in "high" summer use areas. Human transportation impacts were classified as high near Anchorage, and in the central waters of the upper and lower Inlet. They summarized water quality as poor in the region of the shoreline from the Beluga River into Knik Arm and the shoreline from Point Possession to Chickaloon Bay, and in Turnagain Arm and remaining shoreline areas of Cook Inlet. Water quality was rated as moderate in the central waters of the inlet.

Oil spills

There are no data indicating the beluga whales from the Cook Inlet stock suffered any adverse effects from the 1989 *Exxon Valdez* oil spill in Prince William Sound or the 1987 *Glacier Bay* oil spill in Cook Inlet (near Nikiski). The latter oil spill occurred in July in an area where beluga whales commonly are found.

Noise

Blackwell and Greene (2002A) conducted an acoustic research program within upper Knik Arm in 2001. They identified underwater noise levels (broadband) as high as 149 dB re: 1μ Pascal associated with a tug boat docking a barge. Observations did not indicate that such noise was causing avoidance by the whales. However, NMFS (2005) pointed out that it is possible that the whales are tolerating noise that would otherwise disturb them in order to feed. Ambient underwater sound levels were lowest at two locations, the mouth of the Susitna River and east Knik Arm, near Birchwood, both of which are highly used by beluga whales. Blackwell and Greene (2002A) also found that underwater noise associated with the Phillips A oil platform underwater noise was generally below 10 kHz. Noise from the platform between 2 and 10 kHz was measured as high as 85 dB re: 1μ Pa. out to19 kilometers (NMFS, 2005). Blackwell and Greene concluded that, overall, noise levels in Cook Inlet would not be expected to have more than a minor effect on beluga whales.

Native Take

As summarized in the affected environment section, Native take of beluga whales in the 1990's was unsustainably high, and evidence indicates this take caused the recent decline in abundance of this stock (see Mahoney and Shelden, 2000). Between 1993 and 1998, reported take ranged from 21-123 whales per year, for a mean annual take of 65 belugas per year. As discussed in the affected environment section, Native take now is regulated and limited to two strikes per year, for a total of six strikes in 4 years. The regulation of Native take is considered permanent and is expected to remain in place at least until the stock is considered to have recovered from its current depleted status. There were no reported belugas taken by Alaskan Native subsistence harvests in 1999 or 2000. In 2001, the village of Tyonek took one whale.

Commercial Fisheries Interactions

Evaluation of recent levels of commercial-fishery interactions with Cook Inlet beluga whales is hampered by sampling problems associated with the logbook reporting program during 1990-1993 (National Marine Fisheries Service, 2000), and because fisher self-reporting programs likely provide only minimum estimates of interaction levels (Hill and DeMaster, 1998). No interactions between beluga whales and northern Gulf of Alaska groundfish trawl, pot, or longline fisheries were reported during 1990-1999 (Hill and DeMaster, 1998). From 1995-1999, there were no self-reports of injury or mortality to beluga whales from fishers in the lower Cook inlet herring sac-roe fishery, mechanical/hand-jig fishery for lingcod and rockfish, or salmon purse-seine fisheries (National Marine Fisheries Service, 2000). From 1995-1999, there were no self-reports of injury or mortality to beluga whales from the razor clam hand-dig fisheries, herring gillnet fisheries, or salmon drift- and set-gillnet fisheries in upper Cook Inlet. Observers were deployed in the salmon driftnet fishery, and upper and lower Cook Inlet set-gillnet fisheries were observed in 1999 and 2000. Preliminary data showed that during 6,123 hours of observation by 30 biologists of about 4,258 hauls of drift and set gillnet fisheries, no marine mammal mortalities were observed. Only three sightings of were made of beluga whales in 1999, each from an observer at a set-gillnet site in upper Cook Inlet (National Marine Fisheries Service, 2000; Merklein, Fadely, and van Atten, unpublished presentation and data, provided by Fadely, 2003, pers. commun.). Beluga whales were not observed within 10 meters of a net in the set or drift gillnet fisheries. Murray and Fay (1979, cited in Hazard, 1988) reported that five beluga whales were taken in salmon gillnet fisheries in Cook Inlet in 1979. Burns and Seaman (1986) estimated that three to six beluga whales were taken incidental to commercial salmon gillnet fisheries in Cook Inlet during 1981-1983. There are reports of takes of beluga whales in Cook Inlet commercial salmon gillnet fisheries. With respect to personal-use fisheries, the National Marine Fisheries Service (2000) summarized that they are unaware of any injury or death of a beluga whale associated with the Cook Inlet personal-use/subsistence gillnet fisheries. NMFS (2005) concluded there is no evidence that competition with commercial fisheries is negatively impacting Cook Inlet belugas.

Climate Change

NMFS (2005) examined available data to determine whether evidence indicate climate change was affecting the recovery of beluga whales. They concluded that data are insufficient to assess whether climate change is having effects on Cook Inlet belugas.

Conclusion

Information on beluga whales indicates that their current depleted status is primarily the result of unsustainably high harvests by Alaska subsistence hunters. However, other factors may have contributed to the decline and may currently be affecting recovery. There is not evidence of recovery since the harvest was regulated. However, it is not clear that additional human-related factors are impeding recovery. Goodman (2004b) indicated that any removal from this population could adversely affect recovery. Effects from this seismic survey are expected to be small and temporary, if they occur, and to be in the form of harassment. It is possible that the whales will avoid the area when the seismic survey is occurring. While their is some increased risk of vessel strike and of exposure to high levels of noise, based on information beluga distribution, we do not expect belugas to be present in waters near the survey. However, it could occur.

Cumulative Effects on Fin Whales

Most stocks of fin whales were depleted by commercial whaling (Reeves, Silber, and Payne, 1998) beginning in the second half of the mid-1800's (Schmitt, de Jong, and Winter, 1980; Reeves and Barto, 1985). In the 1900's, hunting for fin whales continued in all oceans for about 75 years (Reeves et al., 1998) (see information on whaling level in the previous section on current and historic abundance). It is likely that reports of Soviet takes of fin whales in the North Pacific are unreliable (Reeves, Silber, and Payne, 1998), because evidence indicates the Soviets over-reported fin whale catches by about 1,200, presumably to hide takes of species such as right whales and other protected species (Doroshenko, 2000). In 1965, Nemoto and Kasuya (1965) reported that fin and sei whales were the primary species taken in the Gulf of Alaska during Japanese commercial whaling in recent catches. Figure 1 of that report documents that in 1963, more than 150 fin whales were taken just south of the Kenai Peninsula. Other areas of high take in 1963 were southeast Alaska especially and areas offshore between Prince William Sound and Glacier Bay. Multiple smaller groups of fin whales were taken offshore of areas south of Kodiak Island and the Alaska Peninsula to Unimak Pass, and large numbers were taken throughout the northern Gulf in an area bounded on the south at approximately 53° N. Latitude. Legal commercial hunting ended in the North Pacific in 1976.

There is no evidence of subsistence take of fin whales in the Northeast Pacific (Angliss, DeMaster, and Lopez, 2001; Angliss and Lodge, 2002).

There is little information about natural causes of mortality (Perry, DeMaster, and Silber, 1999d). In 2002, the National Marine Fisheries Service summarized that "There are no known habitat issues that are of particular concern for this stock" (Angliss, DeMaster, and Lopez, 2001; Angliss and Lodge, 2002). Documented human-caused mortality of fin whales in the North Pacific since the cessation of whaling is low. Perry, DeMaster, and Silber (1999d:51) list the following factors possibly influencing the status of fin whales in the North Pacific: Offshore oil and gas development as a "Present or threatened destruction or modification of habitat" and vessel collisions as an "Other natural or man-made factor." The possible influences of disease or predation and of overutilization are listed as "Unknown." Documented fishery interaction rates are low in the North Pacific. However, the only information available for many fisheries in the Gulf of Alaska comes from self reporting by individual fishers. Such data likely are biased downwards. Based on the death in 1999 of a fin whale incidental to the Bering Sea/Aleutian Island groundfish fishery, National Marine Fisheries Service estimates three mortalities in 1999 and an average yearly take of 0.6 [coefficent of variation (CV) = 1]) between 1995 and 1999 (Angliss and Lodge, 2002). In the North Atlantic, nine entanglements were recorded in the National Marine Fisheries Service Northeast Regional entanglement database between 1975 and 1992 (Blaylock et al., 1995) and three other instances indicating entanglement were recorded between 1992 and 1996 (Waring, et al., 1998). In the North Atlantic, there is concern about the potential impact of overexploitation of certain fish stocks on fin whales (Perry, DeMaster, and Silber, 1999d). Reported instances of fin whale deaths due to vessel strikes are low. One fin whale death due to vessel strike was reported in the North Pacific in 1991 (Perry, DeMaster, and Silber, 1999d), and a fin whale was struck by a vessel in Uyak Bay in 2000. In the North Atlantic, there is documented effect on behavior from whale watching and other recreational boat encounters and from commercial-vessel traffic (for example, Stone et al., 1992) and also evidence of habituation to increased boat traffic (Watkins, 1986). Perry, DeMaster, and Silber (1999d) summarized that noise from seismic exploration did not appear to affect fin whales in detectable ways (McDonald et al., 1993).

Cumulative Effects on Humpback Whales

Commercial whale hunting resulted in the depletion and endangerment of humpback whales. Unregulated hunting legally ended in the North Pacific in 1966. The National Marine Fisheries Service (1991a) reports that entrapment and entanglement in active fishing gear (O'Hara, Atkins, Ludicello, 1986) as the most frequently identified source of human-caused injury or mortality to humpback whales. Entrapment and entanglement have been documented in Alaska (for example, von Zeigesar, 1984 cited in von Ziegesar, Miller, and Dahlheim, 1994). From 1984-1989, 21 humpbacks are known to have become entangled in gear in Alaska. Gear types included gill nets, seine nets, long lines or buoy lines, and unidentified gear.

Vessel collision also is of concern for humpbacks. The National Marine Fisheries Service (1991a) reported that at least five photographed humpbacks in southeastern Alaska had gashes and dents probably caused by vessel strikes.

The National Marine Fisheries Service (1991a) also lists noise and disturbance from whale-watching boats; industrial activities; and ships, boats, and aircraft as causes of concern for humpback whales. The impact of pollution on humpbacks is not known. Habitat degradation also could occur due to coastal development. In Hawaii humpback habitat, harbor and boat-ramp construction, vessel moorings, water sports, increased boat traffic, dumping of raw sewage by boats, runoff and overflow of sewage from land sites, and agriculture and associated runoff are all potential causes of habitat degradation.

Cumulative Effects on Steller Sea Lions

We would expect any incremental effects attributable to the proposed seismic survey in eastern Lower Cook Inlet to be insignificant for the eastern and western population stocks of Steller's sea lions. The primary potential for incremental contributions to cumulative adverse effects on Steller's sea lions from this survey could result from incremental increases in noise and disturbance at foraging habitats in Lower Cook Inlet, relatively near to the site of the seismic survey. Any large displacement, particularly of juvenile, western population stock Steller sea lions from important foraging habitats could result in a significant cumulative adverse effect on this population stock. Displacement from important feeding habitats would not have to be years in duration to have a potentially significant cumulative effect, especially if juveniles from this stock were displaced. We are not aware of any information that indicates such an effect would be expected from this seismic survey. The survey will occur in a relatively small area. All airguns will not be firing for many hours every day. Steller sea lions responses to airguns are variable. Any potential increase in mortality of Steller sea lion prey species in sea lion critical habitat that resulted in a large decrease in prey available to the western stock of Steller sea lions could result in potentially significant cumulative effect on both the stock and on the critical habitat. There is no designated marine or terrestrial critical habitat that we expect, based on evaluation of the best available information, to be affected in this area.

The National Marine Fisheries Service (2001b) presented information and discussion on past external adverse impacts on Steller sea lions in Appendix J. Significant sources of past effects included take in foreign fisheries, take in other fisheries, and commercial harvest. It is suspected that decreases in population size before the 1960's were likely due to human exploitation of this species (National Research Council, Committee on the Bering Sea Ecosystem, 1996).

The National Marine Fisheries Service (2001b) has concluded that there is some concern for the take of Steller sea lions due to encroachment by humans near critical terrestrial habitat sites (for example, rookeries, haulouts) for viewing, research, or intentional harassment.

Marine Oil Spills

Because of inconclusive or inadequate studies following previous oil spills in the region, we cannot confidently evaluate the cumulative impacts of oil spills on sea lions. As summarized in the discussion of the potential impacts of a very large spill, and of the potential effects related to development and production, some Steller sea lion haulouts were directly in the plume of oil spilled in Prince William Sound due to the grounding of the *Exxon Valdez*. When oil exited the Sound, it passed by rookery sites in the Barren Islands and haulouts and rookeries farther west. Calkins et al. (1994) concluded that none of their data provided conclusive evidence of an effect of the *Exxon Valdez* oil spill on Steller sea lions. The

National Marine Fisheries Service (2002:4-212) concluded that "…insufficient data exists to determine the overall impact of the spill on the population." In March 1970, two dead and oiled sea lions were found on Long Island in Chiniak Bay on the eastern side of the Kodiak Archipelago following a large oil spill that most likely resulted from the release of oil from tanker "slops" and/or ballast waters at sea. This spill resulted in substantial amounts of oil being spread on long distances of rugged coastline in the Kodiak area. "Numerous seals and sea lions covered with oil have been reported by commercial hunters" (Federal Water Pollution Control Administration (1970). However, due to inadequate pre-spill and post-spill data, no estimates of damage to sea lions or other marine mammals were made.

Entanglement

The National Marine Fisheries Service (2002:4-212) concluded that "Entanglement in marine debris is also a source of mortality with an estimated 100 Steller sea lions killed each year." However, the National Marine Fisheries Service (2002:4-213) also concluded that the frequencies at which sea lions entangle in derelict fishing gear or other materials "…seems to occur at frequencies that do not have significant effects upon the population."

Native Take

Based on village interviews, Wolfe and Hutchinson-Scarbrough (1999) reported estimated subsistence takes of Steller sea lions for subsistence by Alaskan Natives between 1992 and 1998, inclusive. In 1998, they estimated that 178 Steller sea lions were taken. The associated 95% confidence interval was 137-257 sea lions. Of the take, 26.4% (47 sea lions) were struck and lost and 73.6 % (131) were harvested. Eighteen of sixty-two surveyed communities reported taking sea lions. More males were reported taken than females (6.6:1), and more adults (48.2%) were reported taken than juveniles (33%) or pups (18.4 %). The numbers of sea lions taken in previous years were as follows: 1992, 549; 1993, 487; 1994, 416; 1995, 339; 1996, 186; and 1997, 164. Most of the animals are taken by Aleut hunters from the range of the western U.S. stock in the Aleutian Islands and the Pribilof Islands.

Illegal Intentional Killing

The National Marine Fisheries Service (2002) concluded that Steller sea lions were intentionally shot in several nearshore fisheries before and after the passage of the Marine Mammal Protection Act in 1972. Such shooting continued until at least the early 1990's, when sea lions were listed as threatened under the ESA and a ban on shooting at Steller sea lions was enacted (Hill and DeMaster, 1999). Loughlin and York (2001, unpublished manuscript) conclude that the current rate of mortality from this cause is difficult to evaluate. However, it is clear that illegal shooting still occurs. They report that estimates (based on Trites and Larkin, 1992, cited in Loughlin and York, 2001, unpublished manuscript) of shooting-related mortality range from 1,180 in 1985 to zero. Loughlin and York (2001, unpublished manuscript) guessed (their term) that the annual mortality is at least 50 animals/year.

Incidental Take in Commercial Fisheries

There have been substantial negative impacts on Steller sea lions from take in fisheries since the 1960's. Perez and Loughlin (1991) concluded that over 20,000 Steller sea lions were likely killed in foreign Joint Venture fisheries from 1966-1988. Fisheries such as State-managed drift- and set-gillnet fisheries contributed to the take, although this take is not well defined. Based on data indicating that Steller sea lions rarely travel beyond the U.S. Exclusive Economic Zone, Hill and De Master (1999) concluded that current levels of take of this species in foreign fisheries are relatively low. The documented take in other fisheries is also low. Hill and DeMaster (1999) estimated that 14.5 sea lions per year were taken incidental to the Prince William Sound drift-gillnet fishery for 1990 and 1990. Self-reported levels of take from six unobserved fisheries were about 6.1 animals per year. Hill and DeMaster (1999) estimated that the total take from fisheries, including groundfish fisheries, is about 30 animals per year. However, it must be stressed that most fisheries-interactions studies have been small in scope and short in duration. Existing data are insufficient to confidently estimate levels of fishery take.

While referring to takes of cetaceans and pinnipeds in set-gillnet and driftnet fisheries, Read and Wade (2000:933) point out the following: "Because so few fisheries have been monitored in Alaska, we do not know the magnitude of these takes. Therefore, although only a few stocks in Alaska had takes greater than Potential Biological Removal, this result should be considered uncertain pending observations of the many category II gill-net fisheries in that area."

When the annual subsistence harvest is combined with the annual take in fisheries, the total take is about 88% of the Potential Biological Removal of 234 animals for the western stock U.S. stock of Steller sea lions

Fishery Impacts on Effects on Prey Abundance

Both State run (for example, salmon and herring) domestic fisheries, as well as foreign fisheries likely have had negative impacts on the abundance and availability of prey for Steller sea lions (National Marine Fisheries Service, 2002). Recent fishery-management plans have attempted to address this issue by prohibiting types of fishing for Steller sea lion prey species in certain areas. This issue is discussed in great detail by the National Marine Fisheries Service (2001b).

Human Settlement and Disturbance Related Threats

Many of the human settlement and human disturbance-related issues detailed in Section V.C.5.f(3)(e)3)f) for sea otters also pose potential threats to sea lions. Both share much of the same range, and as carnivores are susceptible to some of the same threats. For example, there is risk to Steller sea lions from introduced disease, due to increasing levels of human settlements and concomitant increases in the presence of species, such as domestic dogs and cats, both of which can serve as reservoirs of disease (for example, canine distemper [dogs] and protozoal [*Toxoplasma gondii*] infection capable of causing encephalitis [cats]), which potentially can be harmful to Steller sea lions.

Cumulative Effects on Designated Critical Habitat of Steller Sea Lions

The National Marine Fisheries Service (2001b) has concluded that, in Alaska, there does not appear to have been loss of terrestrial habitat critical to Steller sea lion survival and recovery due to construction or other physical degradation and that such habitat appears to be in good physical condition. Human encroachment on or near terrestrial critical habitat site (for example, rookeries or haulouts, or both) for research, viewing and intentional harassment (National Marine Fisheries Service, 2001b) may be compromising the value of some sites for Steller sea lion survival and/or recovery.

The National Marine Fisheries Service (2001b) states that previous biological opinions concluded that the availability of important Steller sea lion fish-prey species was reduced by groundfish harvests in designated critical habitats.

The National Research Council (National Research Council, Committee on the Bering Sea Ecosystem, 1996) suggested that long-term climate-induced changes in the distribution and abundance of Steller sea lion prey might have contributed to the steep declines that have occurred during the past few decades in Steller sea lion abundance. Anderson and Piatt (1999), and Merrick, Loughlin, and Calkins (1987) suggested that declines in food availability and in abundance of high-quality forage fish led to food-related stress in several marine mammals.

F. Effects of the Alternative to the Proposed Action.

Alternative II - No Survey: There would be no environmental impacts.

V. CONSULTATION AND COORDINATION

Letters and email that summarize the MMS consultation and coordination with the U.S. Department of the Interior, Fish and Wildlife Service and the U.S. Department of Commerce, National Marine Fisheries Service, are included in Appendix II.

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Table IV.A.2-1
Estimated Abundances of Belugas by Year and Location in Cook Inlet

Year	Northwest[1]	CV	Northeast[2]	CV	South[3]	CV	Total	CV
1994	580	47%	48	108%	25	19%	653	43%
1995	444	48%	31	43%	17	43%	491	44%
1996	542	30%	52	37%	0	—	594	28%
1997	362	9%	76	69%	2	43%	440	14%
1998	292	32%	55	60%	0	—	347	29%
1999	336	15%	31	25%	0	—	367	14%
2000	408	23%	27	82%	0	—	435	23%
2001	—	—	—	—	—	—	386	09%
2002	—	—	—	—	—	—	313	12%
2003	—	—	—	—	—	—	357	11%
2004	—	—	—	—	—	—	386	20%

Notes:
[1] Northwest is described as West Forelands to Anchorage, including Beluga River, Susitna Rivers, and Knik Arm.
[2] Northeast is described as Anchorage to East Forelands, including Turnagain Arm and Chickaloon Bay.
[3] South is anywhere south of the Forelands down to the mouth of Cook Inlet.

Key:
— = not given
CV = coefficient of variation

Source:
1994-2000 data: Hobbs, et al. (2000:42, Table 3); 2001 data: Mahoney (2002) and Rugh et al.(2005:36, Table 6); 2002-2004: Rugh et al.(2005:36, Table 6).

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

July 6, 2005

Mr. Pete Sloan
Minerals Management Service
Alaska OCS Office
3801 Centerpoint Drive, Suite 50
Anchorage, Alaska 99503

Dear Mr. Sloan:

The National Marine Fisheries Service (NMFS) met recently with your staff and VERITAS geophysical company regarding their proposal to conduct a seismic geophysical survey in lower Cook Inlet during the fall of 2005. This work would occur in both Federal and State waters. NMFS assessed similar work proposed for Cook Inlet in 2003, and at that time reviewed a Corps of Engineers permit for the work and formulated comments and recommendations. The work was not done, however, we feel those comments are appropriate to this new work, and are writing to clarify our position and concerns.

The area of Cook Inlet (the "Cosmopolitan Unit") is near Anchor Point, Alaska in nearshore waters of shallow to intermediate depths. These waters may contain various species of marine mammals, including beluga whales, harbor porpoise, Steller sea lions, harbor seals, humpback whales, and fin whales. Seismic work has the potential to injure or harass these animals due to the introduction of very loud noise into the water column. Such harassment may constitute a "take", which is a violation of the Federal Marine Mammal Protection Act (MMPA) unless specifically permitted. Therefore, NMFS has recommended VERITAS seek MMPA authorization for incidental taking of marine mammals by this work. VERITAS has not applied for such authorization. Without one, any taking due to this survey would not be protected from the penalties of that act.

NMFS and MMS have met with VERITAS to discuss these concerns, and VERITAS has provided data on their modeling of the noise propagation from the seismic array. NMFS normally considers the threshold for noise harassment of marine mammals to be 160 dB re: 1 micro pascal. VERITAS predicts the airgun array noise would decay to this level at a range of approximately 500 meters, and suggests this as the "shut-down" criterion or safety zone. NMFS believes the proposed model is probably representative of Cook Inlet. However, because these levels have not been empirically derived, and because we believe that marine mammals will likely be in or near the project area, we recommend VERITAS validate these levels and ranges in Cook Inlet prior to the study. Also, VERITAS has used frequency filtering in projecting noise levels with range. The industry has been informed in the past that its use of high-band pass filters was not appropriate. This allows them to improperly estimate smaller impact zones. The best scientific information is from Tolstoy et al (2004) and their closest comparable tested array size to the airgun array being used in Cook Inlet is the 12-gun which is a 3755 cubic inch array with a 250 dB zero to peak. The radii for this configuration is

Shallow Water	160 dB = 9 km (recorded)
	180 dB = 2 km (recorded)
Deep Water	160 dB = 2.5 km (recorded)
	180 dB = 600 m*

- This value was estimated from Tolstoy et al. (2004), Figure 2 and is also in 2004 LDEO GOM IHA application, Table 1. Because VERITAS has not obtained an MMPA Incidental Harassment Authorization (IHA), they must be able to monitor and shut-down whenever marine mammals enter the 160-dB isopleth, using on-site verification tests prior to conducting seismic.

While these data were for a larger array, they indicate a considerable disparity between the 160 dB isolpleth associated with that study and the safety zone developed through the VERITAS model. The field validation work will address this issue.

We recommend several additional monitoring or mitigation measures to reduce the probability of taking marine mammals during the course of this work:

1. NMFS–approved monitors shall be on board the source vessel during surveys, and will observe for the presence of marine mammals. Observers will instruct the vessel operators to immediately stop or de-energize the array whenever a marine mammal is seen within the 160 dB re: 1 micro pascal isopleth, or is likely to enter that zone. The area shall be monitored to insure marine mammals are not present for at least 30 minutes before resuming survey work.

2. The array should be sequentially energized (ramp-up) at the start of surveys by firing the smaller guns first, then adding additional guns to gradually reach full output.

3. If the array is powered down for any reason during night time or poor sighting conditions, it may not be re-energized until daylight or whenever sighting conditions allow for the exclusion zone to be effectively monitored from the source vessel.

4. We recommend the array, or at least one gun, continue firing during line changes. However, the array should be shut down during tide-cycle delays.

5. Any shut downs due to marine mammals within the safety zone, and any injury to a marine mammal must be immediately reported to the NMFS Anchorage office ((907) 271-3023: Brad Smith).

Provided these measures are followed, we believe this action is consistent with the Endangered Species Act (ESA) section 7 consultation for the Cook Inlet Multi-sale. However, because no Marine Mammal Protection Act (MMPA) authorization exists for this work, we cannot issue an Incidental Take Statement for the survey. Any takings of a marine mammal or endangered species due to the seismic survey may be subject to the prohibitions of the ESA and MMPA.

Please direct any questions to Brad Smith in our Anchorage field office at (907) 271-3023.

Sincerely,

For James W. Balsiger
Administrator, Alaska Region

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
Alaska Outer Continental Shelf Region
3801 Centerpoint Drive, Suite 500
Anchorage, Alaska 99503-5823

JUL 18 2005

Memorandum

To: Regional Director
U.S. Fish and Wildlife Service, Region 7

From: Regional Director
Minerals Management Service, Alaska OCS Region

Subject: Endangered Species Act Section 7 Consultation for Cook Inlet Leasing and Exploration: Proposed 3-D Seismic Survey in Cook Inlet by Veritas DGC

The Minerals Management Service (MMS) has received a request from Veritas DGC for a Geological and Geophysical (G&G) permit to conduct a 3-D geophysical (seismic) survey in eastern Lower Cook Inlet. The proposed survey would be conducted between September 5 and November 15, 2005. In the Outer Continental Shelf (OCS), the survey would extend about 6 miles offshore from Anchor Point, covering about 30 square miles of OCS water that ranges in depth from approximately 90 to 130 feet (30 to 40 m). Veritas DGC has also applied to the State of Alaska to survey adjacent State waters. The MMS G&G permit would authorize only that portion of the survey that would occur in OCS waters.

Based on information from the Fish and Wildlife Service (FWS) and data from the recent MMS-funded study (below), Steller's eiders are not typically expected to occur within these OCS waters in eastern Lower Cook Inlet before November 1st. In 2002-2003, the U.S. Army Corps of Engineers (COE) consulted with FWS related to the COE's permitting of seismic survey activities near the currently proposed OCS survey area. In the February 3, 2003, Biological Opinion to COE, the FWS defined a timing window for wintering Steller's eiders in this area as November 15th - April 15th. The proposed activities would not occur during this period.

We have recently reviewed new information and re-evaluated the potential for effects from this action and found they are consistent with our previous conclusions and discussions. In our consultation with FWS for proposed Alaska OCS Cook Inlet Planning Area Oil and Gas Lease Sales 191 and 199, we considered and discussed potential effects of seismic surveys on listed species in Lower Cook Inlet. In accordance with provisions of Section 7(a)(2) of the Endangered Species Act (ESA), MMS requested formal consultation with FWS on leasing and exploration activities associated with proposed Lease Sales 191 and 199 on November 12, 2002. On February 18, 2003, FWS notified MMS that it had determined that the proposed Lease Sales 191 and 199, and subsequent exploration activities, are not likely to adversely affect listed species or jeopardize the continued existence of candidate species. In the letter, FWS stated that:

> "...We made this determination after considering that Steller's eiders are not known to occur within the proposed action area, and the chance of leasing or exploration activities having an adverse affect upon this species is extremely low."

In a memorandum, dated March 21, 2003, FWS clarified that it had concluded that formal consultation was not necessary for the proposed Lease Sales 191 and 199 and related exploration activities. With respect to Steller's eiders specifically, FWS stated that:

> "...the probability of leasing or exploration activities having an adverse effect upon this species is discountable."

The March 21, 2003 memorandum, FWS also stated that:

> "The Cook Inlet Outer Continental Shelf Oil and Gas Lease Sales 191 and 199, and subsequent exploration activities, as currently proposed, are not likely to adversely affect Steller's eiders, or jeopardize the continued existence of the southwest Alaska candidate population of northern sea otters. This concurrence supersedes all previous biological opinions for OCS oil and gas leasing activities in Cook Inlet."

Following the aforementioned consultation in 2002-2003, MMS initiated a two year study, entitled *Survey of Steller's Eiders Wintering in Lower Cook Inlet* (Interagency Agreement 34160), that was conducted in the winters of 2003-2004 and 2004-2005 by W. Larned, an expert on the distribution and abundance of Steller's eiders and an Anchorage Region FWS biologist. MMS has reviewed all information from this study and our staff has spoken with Mr. Larned about the surveys. The systematic data collected during this study support FWS's previous conclusion that Steller's eiders are unlikely to occur within OCS waters in this part of Cook Inlet, but are most likely to occur in areas known to have shallow reefs.

Thus, better, more systematic information about the distribution and abundance of Steller's eiders in Cook Inlet has become available to MMS and FWS since our previous consultation on leasing and exploration in the OCS in Lower Cook Inlet regarding proposed Lease Sales 191 and 199. We conclude that this new information is in general agreement with the less systematic information available in late 2002 and early 2003, upon which FWS based its previous conclusions about potential effects of MMS oil and gas leasing and exploration activities on Steller's eiders.

Based on FWS's categorization, the designated Distinct Population Segment (DPS) of sea otters from the Southwest Alaska population stock of sea otters, currently proposed for listing under the ESA, are not expected to occur on the eastern side of Cook Inlet near the proposed seismic survey area. Based on previous consultations, no other listed species under the jurisdiction of FWS are expected to occur, and no designated critical habitat under the jurisdiction of FWS exists, within areas that could be affected by the proposed seismic survey in OCS waters. We are not aware of new information that indicates that the proposed seismic survey may adversely modify or destroy designated critical habitat, for any species under the jurisdiction of the FWS.

If you have any comment or questions related to this matter, please contact Dr. Lisa Rotterman (907) 334-5245.

cc: Field Office Supervisor, U.S. Fish and Wildlife Service, Region 7

Finding of No Significant Impacts

The Minerals Management Service (MMS) has prepared an Environmental Assessment (EA) for a proposed geophysical (seismic) survey of the Cosmopolitan Unit on the Outer Continental Shelf (OCS) in Lower Cook Inlet. During November 2003, MMS filed with the Environmental Protection Agency a multiple-sale EIS assessing the general effects of seismic surveys in Lower Cook Inlet. This EA tiers from the multiple-sale EIS and incorporates much of the material by reference. The EA examines the potential environmental effects of the specific proposed survey of the Cosmopolitan Unit and of alternatives with additional mitigation.

The general information and analysis presented in the multiple-sale Environmental Impact Statement was prepared and reviewed by MMS. Resources covered by the Endangered Species Act (ESA) and others were determined to have site-specific effects, requiring additional evaluation of the environmental impact analysis: ESA-covered birds, ESA-covered marine mammals, other marine and coastal birds, other marine mammals, fish and fisheries. The site-specific information is presented in the EA. The EA also analyzes whether this new information indicates that there are likely to be significant impacts.

Based on the analyses in the EA, we have identified no significant effects from the seismic survey with standard MMS and proposed mitigation. Therefore, the MMS has determined that an Environmental Impact Statement is not required and is issuing this Finding of No Significant Impacts.

Supporting Document:

Final Environmental Impact Statement, Cook Inlet Planning Area, Oil and Gas Lease Sales 191 and 199, OCS EIS/EA MMS 2003-055, dated November 2003.

[signature] Date 7/20/05

Regional Supervisor
Leasing and Environment
Alaska Region