C. Effects on Polar Bear

IV.C.2.e. Polar Bear. This section updates the assessment of effects on polar bears as a result of the Proposed Action. The section includes four subsections, which summarize the multiple-sale EIS and Sale 195 EA assessments that are being updated, update those effects, incorporate the benefits of the standard mitigation, and summarize the conclusion (i.e., the mitigated effect).

IV.C.2.e(1) Summaries of Multiple-Sale EIS and Sale 195 EA Assessments Updated by this EA and the recent Sale 202 EA. The Beaufort Sea multiple-sale EIS (USDOI, MMS, 2003:Sec. IV.C.7.b(2) concludes the following about the effects on polar bears: "The effects from activities associated with ...exploration and development are estimated to include the loss of small numbers of…polar bears…(…perhaps 6-10 bears…), with populations recovering within about 1 year."

The EA for Sale 202 concluded that, based on new information, there is the potential for significant population-level effects to polar bears due to the proposed lease action.

IV.C.2.e(2) Update of those Effects for the Proposed Action I. Potential adverse impacts to polar bears are an increasing concern due to ongoing changes in their sea-ice habitat, their distribution, and the uncertain status of their populations. For purposes of this analysis, the multiple-sale EIS defines a potentially significant impact to polar bears as: "An adverse impact that results in an abundance decline and/or change in distribution requiring...one or more generations...for the indicated population to recover to its former status" (USDOI, MMS, 2003:Sec. IV.A.1).

Documented impacts to polar bears to date in the Beaufort Sea by the oil and gas industry appear minimal. Since 1968, there have been only two documented cases of lethal takes of polar bears associated with oil and gas activities in the Southern Beaufort Sea: one at an offshore drilling site in the Canadian Beaufort Sea (1968) and one bear at the Stinson site in the Alaska Beaufort Sea (1990). Another bear died on an offshore island in the Alaska Beaufort Sea (1988) after it ingested ethylene glycol, although the source was never determined. In contrast, 33 polar bears were killed in the Canadian Northwest Territories from just 1976-1986 due to encounters with industry (Stenhouse, Lee, and Poole, 1988).

IV.C.2.d(2(a) Updated Oil-Spill Effects. Potential adverse impacts to polar bears from oil and waste-product spills as a result of industrial activities in the Beaufort Sea are a major concern. As far as is known, however, marine mammals have not been affected by oil spilled as a result of North Slope industrial activities to date, although at least one polar bear fatality has resulted from ingestion of industrial chemicals (Amstrup, Myers, and Oehme, 1989). With the limited background information available regarding large oil spills in the offshore arctic environment, the outcome of a large oil spill is uncertain.

Spilled oil can have dramatic and lethal effects on marine mammals, as has been shown in numerous studies, and a large oil spill could have major effects on polar bears and seals, their main prey (St. Aubin, 1990a,b). In polar bears, oiling can cause acute inflammation of the nasal passages, marked epidermal responses, anemia, anorexia, stress, renal impairment, and death. These effects may not become apparent until several weeks after exposure to oil. Oiling of the pelt causes serious thermoregulatory problems for marine mammals by reducing its insulation value. Skin damage and hair loss also can occur (Oritsland et al., 1981). Because bears frequently groom their fur when it is fouled, we can expect that a spill in the Beaufort Sea would result in contaminated bears ingesting oil, and thus become susceptible to both lethal and chronic, sublethal effects of hydrocarbon exposure. Spilled oil also can concentrate and accumulate in leads and openings that occur during spring breakup and autumn freezeup periods. Such mechanical concentration of spilled oil would increase the chance that polar bears and their principal prey would be oiled (Amstrup, Durner, and McDonald, 2000). Bears are known to be attracted to petroleum products and can be expected to actively investigate oil spills; they also are known to consume foods fouled with petroleum products (Derocher and Stirling, 1991). In fact, one subadult polar bear in Canada was observed drinking an estimated four liters of hydraulic oil from a pail left outside of a building (Derocher and Stirling, 1991). Its subsequent fate was not determined.

Amstrup et al. (2000) calculated the number of polar bears potentially killed by a 5,912-bbl spill at the Liberty prospect using hypothetical oil spill scenarios created by MMS with modification of the OSRA model. Amstrup et al. calculated a "worst case scenario" for a large oil spill, and assumed that all bears that contacted an oil spill would die. The number of oiled bears ranged from 0-25 bears during the open-water period (August 22-September 30) and 0-61 bears during the broken-ice period (October 1-November 9) (Amstrup, Durner, and McDonald, 2000; Durner and Amstrup, 2000). In most hypothetical oil spills they modeled, the median number of bear fatalities was fewer than 12, while the maximum number was 61. Oil-spill scenarios were only modeled out to 10 days due to the limits of the model's analytical power beyond that timeframe (Amstrup, Durner, and McDonald, 2000). However, it should not be assumed that the effects of an oil spill would last for only 10 days, or that beaches and barrier islands would not be fouled for a year or more. Also, the model only analyzed spills that originated from Liberty Island. Results likely would be much different if the model analyzed spills that originated in other areas (e.g., near Kaktovik or Barrow) and if modeled for longer than 10 days.

Due to the seasonal distribution of polar bears, the times of greatest impact from an oil spill are summer and autumn (Amstrup, Durner, and McDonald, 2000). This is important because distributions of polar bears are not uniform through time. In fact, nearshore densities of polar bears are two to five times greater in autumn than in summer (Durner and Amstrup, 2000), and polar bear use of coastal areas during the fall open-water period has increased in recent years in the Beaufort Sea. This change in distribution has been correlated with the distance to the pack ice at that time of year (i.e., the farther from shore the leading edge of the pack ice is, the more bears are observed onshore) (Schliebe et al., 2005). Surveys flown in September and October 2000-2005 have revealed that 53% of the bears observed along the Alaskan Beaufort Sea coast have been females with cubs, and that 71% (1,100 of 1,547) of all bears observed were within a 30-km radius of the village of Kaktovik, on the edge of the Arctic National Wildlife Refuge (ANWR) (USDOI, FWS, pers. commun.).

Polar bears aggregate along the Beaufort Sea coastline in the fall in areas where marine mammals have been harvested and butchered by Alaskan Native hunters. Specific aggregation areas include Point Barrow, Cross Island, and Kaktovik (USDOI, FWS, 1999). In recent years, more than 60 polar bears have been observed feeding on whale carcasses just outside of Kaktovik (Miller, Schliebe, and Proffitt, 2006), and in the autumn of 2002, North Slope Borough and FWS biologists documented more than 100 polar bears that came ashore in and around Barrow (USDOI, FWS, pers. commun.). Polar bear concentrations also occur during the winter in areas of open water, such as leads and polynas, and areas where beach-cast marine mammal carcasses occur (USDOI, FWS, 1999).

The most recent population data indicate that there are ~1526 animals in the SBS polar bear population, down from previous estimates of ~1800 (Regehr et al., 2006). Although there is a low probability that a large number of bears (i.e., 25-60) might be affected by a large oil spill, the impact of a large spill, particularly during the broken-ice period, would be potentially significant to the polar bear population (65 *FR* 16833). The number of polar bears affected by an oil spill could be substantially higher if the spill spread to areas of seasonal polar bear concentrations, such as the area near Kaktovik, in the fall, and would have a potentially significant impact to the Southern Beaufort Sea (SBS) polar bear population. In fact, based on a population of 1800, the FWS calculated that the Potential Biological Removal (PBR) for the SBS stock, assuming an equal sex ratio for bears removed from the population, is 59 bears per year, of which no more than 30 may be females (Angliss and Lodge, 2004). However, based on the most recent population estimate (Regehr et al., 2006), the PBR level must now be lower (see below).

Current human harvest of the SBS stock is believed already to be at or near the maximum sustainable level; therefore, any mortality due to an oil spill would be additive. Sustainable quotas under the Polar Bear Management Agreement for the Southern Beaufort Sea, a voluntary agreement that limits the total harvest from the SBS population to within sustainable levels, are set at 80 bears per year, of which no more than 27 may be female (Brower et al., 2002). However, based on the new population estimates for the SBS population (Regehr et al., 2006), the sustainability of this quota is in question. Recent harvest levels (2000-2005) from the SBS stock averaged 37 individuals in the U.S. and 25 individuals in Canada, for an average total reported harvest of 62 bears per year (17 female, 34 male, 11 unknown) (USDOI, FWS, unpublished data).

The southern Beaufort Sea polar bear population is unique in that a substantial proportion of its maternal dens occur annually on the pack ice (Amstrup and Garner, 1994), which requires a high level of sea-ice stability for successful denning. Reproductive failure is known to occur in polar bears that den on unstable sea ice (Lentfer, 1975; Amstrup and Garner, 1994). If sea-ice extent in the Arctic continues to decrease and the amount of unstable ice increases, a greater proportion of polar bears may seek to den on land (Durner et al., 2006). Those that do not may experience increased reproductive failure, which would have population-level effects. As a result, land denning likely will become more important in the future, which further highlights the importance of protecting sensitive terrestrial denning habitat.

Coastal areas provide important denning habitat for polar bears, particularly along the ANWR. In fact, the coastal plain of ANWR may have as much as 38% more den habitat than the central coastal plain of northern Alaska (Durner et al., 2006). Amstrup (1993) reported that, between 1981 and 1992, polar bears denned more frequently in ANWR than expected, and Amstrup and Garner (1994) reported that 80% of maternal polar bear dens on land along the southern Beaufort Sea coast occurred in the northeast corner of Alaska and the adjacent Yukon Territory. Studies have shown that more bears are now denning near shore, rather than in far offshore regions. In fact, recent data indicates that ~64% of all polar bear dens in Alaska from 1997-2004 occurred on land, compared to ~36% of dens from 1985-1994. This trend is thought to be related to climate change and changing sea ice conditions (USGS, pers. comm.). The highest density of land dens in Alaska occur along the coastal barrier islands of the eastern Beaufort Sea and within the Arctic National Wildlife Refuge (Amstrup and Gardner, 1994; USGS, pers. comm.). Lentfer and Hensel (1980) suggested that the preponderance of maternal dens in this region may be due to the east-to-west pattern of coastal ice formation in the fall that allows pregnant bears access to terrestrial denning habitat sooner here than in other regions of the coast, although this area simply may have more suitable denning habitat than other areas (Durner et al., 2006). Other important terrestrial denning areas along the Beaufort Sea coast include barrier islands, such as Pingok, Cross, Cottle, Thetis, and Flaxman islands; as well as the Colville, Sadlerochit, and Niguanak River drainages; Point Barrow, Point Lonely, Oliktok Point, Atigaru Point, and Smith Bay (USDOI, FWS, 1999). Considering that 65% of confirmed terrestrial dens found in Alaska from 1981-2005 were on coastal or island bluffs (Durner et al., 2006), oiling of such habitats could have a negative impact on polar bears. In fact, the loss of a large portion of the productivity of the dens from ANWR could undermine recruitment of polar bears into the Beaufort Sea population (Amstrup, 2000). In the event of a large oil spill as a result of the proposed action, the chance of oil contacting the coast of ANWR (LS 43-51) during the open water period is as high as 49% (Appendix II).

The persistence of toxic subsurface oil and chronic exposures, even at sublethal levels, can have long-term effects on wildlife (Peterson et al., 2003). For example, as a result of the *Exxon Valdez* spill, oil persisted in surprising amounts and in toxic forms in coastal areas of south central Alaska and was sufficiently bioavailable to induce chronic biological exposures in animals for more than a decade, resulting in long-term impacts at the population level, particularly for species closely associated with shallow sediments (Peterson et al., 2003). Although it may be true that small numbers of bears may be affected by an oil spill initially, the long-term impact potentially could be much worse. Oil effects can be substantial over the long term through interactions between natural environmental stressors and compromised health of exposed animals, and through chronic, toxic exposure as a result of bioaccumulation (Peterson et al., 2003). Because polar bears are the apical predator of the arctic ecosystem and are also opportunistic scavengers of other marine mammals, and because their diet is composed mostly of high-fat sealskin and blubber, polar bears are biological sinks for lipophilic pollutants that biomagnify up the food chain (Norstrom et al., 1988). The highest concentrations of persistent organic pollutants in arctic marine mammals have been found in polar bears and seal-eating walruses (Norstrom et al., 1988; Andersen et al., 2001; Muir et al., 2000; Wiig et al., 2000). As such, polar bears would be very susceptible to the effects of bioaccumulation of contaminants associated with spilled oil, which would affect the bears' reproduction, survival, and immune systems (USDOI, MMS, 2004:Sec. IV.E.2.e(1)(c)). Sublethal, chronic effects of any oil spill can be expected to further suppress the recovery of polar bear populations due to reduced fitness of surviving animals. Sublethal doses of oil contaminants can cause delayed population impacts such as health, growth, reproduction, and reduced survival in generations born after the spill (Peterson et al., 2003). Additionally, reductions in ringed seal numbers resulting from an oil spill could result in reduced polar bear recruitment and survival.

As stated previously, oil spills in the Beaufort Sea could affect both the SBS and CBS populations of polar bears, with the CBS population being arguably more vulnerable to oil-spill impacts. Although the chance of a large oil spill occurring is slight (Appendix II), the resulting impacts to polar bears would likely be significant. A major concern regarding a large oil spill is the impact it would have on the survival and recruitment rates of these polar bear populations. Both populations potentially would face synergistic impacts from human harvests, global climate change, increased shipping traffic, a declining prey base, drownings due to severe storm events, and increased levels of disease resulting from spending more time on land and concentrated at whale carcass sites. Though the CBS and SBS populations may be able to sustain the additional mortality caused by a large oil spill, the effect of numerous bear deaths (i.e., 25-60) may substantially reduce the population rates of recruitment and survival. Any bears lost to a large oil spill would be a portion of bears lost to all causes, as outlined above, and likely would exceed sustainable levels, affecting both bear productivity and subsistence use, and potentially causing a decline in the bear population (71 *FR* 14,458). In light of the most recent population data and the significant decline in recruitment that has recently been documented in the SBS population (Regehr et al., 2006), this scenario seems even more likely. In order for the bear population to be impacted in this manner, a large volume oil spill would have to take place, the probability of which is low according to the OSRA (Appendix II).

The dependence of polar bear life-history strategy on constantly high adult-survival rates, which is typical of *K*-selected species, causes polar bears to be particularly vulnerable to elevated levels of mortality. Being a *K*-selected species, polar bear populations are particularly sensitive to changes in survivorship, particularly with regard to the reproductive female portion of the population. In fact, the survival rate of adult females is the predominant factor affecting population growth rates of polar bears, although other factors also may be important, such as cub survival, litter size, and age of first reproduction (Taylor et al., 1987). However, the critical issue when considering the long-term effect of any mortality on polar bear populations is the effect on numbers of breeding females. Assuming a realistic rate of natural mortality of approximately 5% per year, the annual increment of adult females would be between 1.0% and 1.6% of the total population. This annual increment is the number of adult females which can be sustainably removed from the population (Taylor et al., 1987). Under *optimal conditions*, the sustainable yield of adult female polar bears typically is <1.6% of the total population (Taylor et al., 1987), which for a population of 1,500 would equate to <24 adult female polar bears per year. It should be noted that these projections are based on a "best case" scenario and are representative of a population in a favorable environment and not experiencing other detrimental effects (Taylor et al., 1987). Recent information (Regehr et al., 2006) indicates that this is likely <u>not</u> the case (see below). These figures are in line with FWS calculations of the PBR for the SBS stock. Previously it was estimated that the PBR level for the SBS stock was 59 bears per year, of which no more than 30 could be females, assuming an equal sex ratio for bears removed from the population (Angliss and Lodge, 2004). However, recent information suggests that the SBS polar bear population may be smaller than previously estimated (~1500 animals), which would mean that even fewer bears could be sustainably removed from the population. For a population of 1500 bears, the PBR level would be <49 bears, of which no more than 24 could be adult females. Current harvest levels likely already exceed this level.

Because populations pushed below their level of maximum sustained yield can become unstable due to stochastic environmental processes, long time periods can be required to recover from mass mortalities (Amstrup, 2000). Hence, recovery (recruitment) rates of polar bears from any mass mortalities would depend on environmental conditions (Taylor et al., 1987). The arctic environment undergoes large-scale fluctuations between and within years, which in turn affects polar bear reproductive success (Taylor et al., 1987). The life-history strategy of polar bears is consistent with that predicted for animals that experience fluctuations in recruitment due to an unpredictable environment. Although polar bears are well adapted to their environment, they also are in a delicate ecological balance with it and, thus, susceptible to chronic and synergistic effects, as outlined previously. For example, according to Regehr et al. (2006):

> "Evidence of declining physical stature and poorer survival of COYs in the SBS region is consistent with other observations, which suggest that changes in the sea ice may be adversely

affecting polar bears. Previously, human harvest accounted for most documented polar bear mortalities in the SBS region (Amstrup and Durner, 1995). In contrast, several recently observed mortalities were directly related to sea ice retreat, or appeared related to changes in food availability that may be associated with sea ice retreat. In autumn of 2004, four polar bears were observed to have drowned while attempting to swim between shore and the distant pack ice. Despite offshore surveys extending back to 1987, similar observations had not previously been recorded (Monnett and Gleason, 2006)... In spring of 2006, three adult female polar bears and one yearling were found dead. Two of these females and the yearling had depleted their lipid stores and apparently starved to death. Although the third adult female was too heavily scavenged to determine a cause of death, her death appeared unusual because prime age females have had very high survival rates in the past (Amstrup and Durner, 1995). Similarly, the yearling that was found starved was the offspring of another radiocollared prime age female that had recently disappeared from the airwaves. Annual survival of yearlings, given survival of their mother, was previously estimated to be 0.86 (Amstrup and Durner, 1995). Therefore, the probability that this yearling died while its mother was still alive was only approximately 14 percent. These anecdotal observations, in combination with both the changes in survival of young and in physical stature reported here, suggest mechanisms by which a changing sea ice environment can affect polar bear demographics and the status of populations."

Environmental instability affects the number of females available for breeding, and the number that actually produce offspring, by affecting their nutritional status and the survival rates of their cubs (Stirling, Andriashek, and Latour, 1975, Lentfer et al., 1980). Hence, there is not a steady rate of recruitment into the population. In fact, on average in Alaska, only 50-60% of polar bears survive to weaning at age 2½ (Amstrup, 2003), dependent on environmental variables. Recent information indicates that survival rates of cubs of the year (COY) are now significantly lower than they were in previous studies, and there has also been a declining trend in COY size. Although many cubs are currently being born into the SBS region, more females are apparently losing their cubs shortly after den emergence, and these cubs are not being recruited into the population (Regehr et al., 2006).

Subadult polar bears are more vulnerable than adults to environmental effects (Taylor et al., 1987). Observations of density dependent and density independent effects on populations of other marine mammals indicate that environmental effects typically are manifest first as reductions in annual breeding success and reduced subadult survival rates (Eberhardt and Siniff, 1977). Subadult polar bears would be most prone to the lethal and sublethal effects of an oil spill due to their proclivity for scavenging (thus increasing their exposure to oiled marine mammals) and their inexperience in hunting. Subadults also are the age strata that most often become "problem bears." As problem bears, they have reduced expectations of survival. Problem bear mortality may be of increasing importance as northern development proceeds (Taylor et al., 1987). Because of the greater maternal investment a weaned subadult represents, reduced survival rates of subadult polar bears have a greater impact on population growth rate and sustainable harvest than reduced litter production rates (Taylor et al., 1987). Likewise, adult females are especially important to population growth rates because reproductive maturity indicates survival through the vulnerable subadult period.

IV.C.2.e(2)(b) Updated Effects from Routine, Permitted Operations. The multiple-sale EIS concluded that "no significant effects are anticipated from routine permitted activities" as a result of proposed Lease Sales 186, 195, and 202 (USDOI, MMS, 2003:Sec. ES.1.e(1)). Though the projected amount of seismic activity has increased since the multiple-sale EIS was written, the effects from routine, permitted operations on polar bears are still expected to be about the same as described in that document, with the exception of oil spill impacts.

IV.C.2.e(2)(c) Summary of Effects Analysis. The updated description of the environment summarized the recent changes in the polar bear habitat and population (Secs. IV.B.2.d(5) and IV.B.3). More polar bears are staying on the coast during autumn, particularly near Cross Island, Kaktovik, and Barrow where there are the remains of subsistence harvests. Also, more polar bears are in the water, where they are vulnerable to severe autumn storms (Monnet and Gleason, 2006).

Recent USGS population analysis indicates that the SBS polar bear population now contains approximately 1500 animals, down from previous estimates of ~1800 (Regehr et al., 2006). This means that the Maximum Sustained Yield (MSY), or the number of animals that can be sustainably removed from the population in any given year, is also reduced.

The updated assessment concludes that the effects of routine, permitted activities, including seismic surveying, are expected to be the same, but concludes that the effects of accidental spills could be worse than previously concluded. One study concluded that the effects of a large oil spill, particularly during the broken ice period, would pose potentially significant risks to the polar bear population (Amstrup, Durner, and McDonald, 2000).

IV.C.2.e(3) Benefits of the Standard Mitigation. Potential impacts to polar bears are an increasing concern because of ongoing changes in their sea-ice habitat, their distribution, and the uncertain status of their populations (Sec. IV.A.1; Appendix D, Section D.4.b). For these reasons, it is reasonable to review the effectiveness of the mitigation measures currently in place.

Because of the widespread occurrence of marine mammals in Alaskan waters, including endangered species, and the increasing level of proposed offshore activities, MMS and other agencies are scrutinizing the potential for oil and gas related activities to involve incidental takes. The taking of small numbers of marine mammals is subject to the requirements of the MMPA and ESA. Incidental taking of marine mammals and endangered and threatened species is allowed only when the statutory requirements of the MMPA and/or the ESA are met.

Section 101(a)(5) of the MMPA (16 U.S.C. 1371(a)(5)) allows for the taking of small numbers of marine mammals incidental to a specified activity within a specified geographical area. Under the MMPA, OCS operators can apply to the FWS for an ITA for polar bears. Procedural regulations implementing the provisions of the MMPA are found in 50 CFR 18.27 for FWS and at 50 CFR 228 for NMFS. Lessees are encouraged to discuss proposed activities with the MMS and FWS to determine if there is a potential for incidental takes and the timing and process for obtaining either an IHA or Letter of Authorization (LOA). In this case, Shell submitted a completed LOA application to FWS in December, 2006.

The MMS regulations require operators to submit oil spill response plans (OSRP's) with proposals for exploration and/or development (CFR 250.203, 204, and 254). The OSRP's must identify methods to protect marine and shoreline resources (30 CFR 254.23), including polar-bear aggregations on shore. The OCS operator will be advised to review the FWS' *Oil Spill Response for Polar Bears in Alaska* at (http://www.fws.gov/Contaminants/FWS_OSCP_05/FWSContingencyTOC.htm) when developing spill-response tactics.

In the past, the response plans for the proposed lease area have relied on equipment that is stored near Prudhoe Bay. Areas near Barter Island and Barrow where polar bears congregate on the coast are remote from this response equipment. If there are proposed operations in these remote areas, MMS may require operators to provide additional response measures to protect polar bears. One such measure might be the prestaging of response equipment near Barter Island and/or Barrow. In the event of an oil spill, it is likely that polar bears would be hazed intentionally to keep them away from the spill area, reducing the likelihood of the spill impacting the population. Care must be taken during response operations, however, to avoid spill-response and/or hazing activities resulting in polar bears being pushed into oiled or inhabited areas.

Existing MMS and other agencies' regulations also provide mitigation. Three standard ITL's: ITL No. 4, Information on Bird and Marine Mammal Protection; ITL No. 9, Information on Polar Bear Interaction; and ITL No. 11, Information on Sensitive Areas to be Considered in Oil-Spill-Contingency Plans. ITL No. 4 advises lessees that they are subject to the MMPA and ESA during the conduct of their operations. ITL No. 4 also encourages lessees to "exercise particular caution when operating in the vicinity of species whose populations are known or thought to be declining and which are not protected under the ESA; such as the Pacific walrus." This ITL has been modified to also emphasize polar bears. ITL No. 4 also notes that disturbance at "major wildlife concentration areas" are of "particular concern", and that "maps depicting major wildlife concentration areas in the lease area are available from the RS/FO." The ITL on polar bear interaction advises lessees to confer with the FWS and to conduct their activities in a way that limits potential encounters and interaction between lease operations and polar bears. ITL No. 11 has been expanded to include a statement that coastal aggregations of polar bears during the open water/broken ice period are particularly vulnerable to the effects of an oil spill, which lessees must account for in their OSRP's. As a result of the Lease Sale 202 EA, a new ITL was developed entitled "Planning for Protection of Polar Bears". This ITL describes the increased vulnerability of polar bears to oil spills during the open water period as a result of recent changes in their distribution, and specifically identifies polar bears in and around Kaktovik as requiring additional protections. According to this new ITL, the MMS is supposed to consult with the FWS to get updated information on polar bear so that it may base decisions on the most current information available.

Indirect benefit also is gained from the MMS Bowhead Whale Aerial Survey Program (BWASP), because the program collects sightings of both bowhead whales and polar bears. The benefits of this program are summarized in the multiple-sale EIS (USDOI, MMS, 2003:Sec. II.H.2.e).

IV.C.2.e(4) Overall Conclusion – The Mitigated Effect. In Alaska, oil leasing and production are accompanied by stipulations and mitigation measures in addition to in-place regulations such as 30 CFR 250. The strength of those requirements and a realistic assessment of their effectiveness must be included in any risk analysis (Amstrup, Durner, and McDonald, 2000). Polar bears are part of a dynamic rather than a static system. Changes in their distributions and populations over the last 5 to 6 years indicate that adaptive management is required to adequately mitigate potential impacts to their populations (i.e. specific mitigation measures developed today may not be applicable 5, 10, or 20 years from now). Because FWS is the management agency responsible for polar bear management, they have the most current information about the status of polar bear populations, the issues facing them, and the most recent research findings applicable to them. Therefore, clear channels of communication with FWS must be established and maintained in order to effectively mitigate the possible oil-spill effects and to ensure that MMS decisions are based on the most current information available.

The MMS is aware of recent decreases in summer sea ice and changes in polar bear distribution and habitat use—particularly in their tendency to aggregate near Cross Island, Kaktovik, and Pt. Barrow in the autumn. Increasing trends in polar bear use of terrestrial habitat in the fall are likely to continue. The MMS realizes that some OCS operations might pose a relatively high spill risk to polar bear aggregations and therefore to the polar bear population as a whole. If an oil spill occurred in offshore waters, the impacts to the polar bear population would potentially be significant, particularly if it occurred near Kaktovik or Barrow.

Because any exploration, development, and production activities that take place in the Beaufort Sea likely will result in the taking of marine mammals, for which operators and their sub-contractors without a valid ITA would be liable under the MMPA, operators are strongly encouraged to obtain LOA's from FWS. An ITA would help mitigate impacts to polar bears and would help ensure that there would be no unmitigable adverse impacts to subsistence uses. Shell submitted a completed LOA appliction to FWS in December, 2006.

By rule and by standard practice, the MMS provides the FWS an opportunity to review Exploration Plans (EP's) and Development and Production Plans (DPP's). However, as of Feb. 1, 2007 the FWS polar bear program had still not received a copy of Shell's EP to review, and thus have had no opportunity to comment on Shell's proposed activities.

To adequately mitigate potential oil spill impacts, MMS must ensure that operators' OSRP's address protection of polar bears, in consultation with the FWS. Although the 202 EA states that "the Regional Supervisor Field Operations will make copies of EP's (and associated Oil-Spill-Congingency Pland [OSCP's]) available to the FWS and other appropriate Federal Agencies for review and comment to ensure that potential threats to polar bears are adequately addressed and mitigated, based on the most current knowledge regarding their habitat use, distribution, and population status", that has not happened in this case. Shell's ODPCP does not address polar bear issues, and there is no indication that Shell read, much less considered, the new polar bear ITL when developing their oil spill plan. The new ITL states, in part that "Lessees are advised to consult with the Fish and Wildlife Service (FWS) and local Native communities while planning their activities and before submission of their Oil-Spill Contingency Plans (OSCP's) to ensure potential threats to polar bears are adequately addressed based on the most current knowledge regarding their habitat use, distribution, and population status, and to ensure adequate geographic coverage and protection are provided under the OSCP. Coastal aggregations of polar bears during the open-waterlbroken-ice period are particularly vulnerable to the effects of an oil spill, which lessees must address in their OSCP's. For example, well-known polar bear aggregations have occurred at Kaktovik, Cross Island, and Point Barrow in close proximity to subsistence-harvested whalecarcass remains. Measures to ensure adequate timely geographic coverage and protection of polar bears may include, but are not limited to, the prestaging of oil-spill equipment at or near locations of polar bear aggregations to support oil-spill-response operations. Lessees are encouraged to consult and coordinate with FWS and the local Native communities to develop plans and mitigation strategies in their OSCP to prevent adverse effects to known bear aggregations. Even though Shell plans to drill ~15 miles off the coast of Kaktovik, there is no mention anywhere in their EP that polar bear aggregations during the open water period are vulnerable to oil spills and there is no discussion anywhere in the ODPCP about what they intend to do to mitigate that threat. Furthermore, as of Feb. 1, 2007 the FWS polar bear program had still not received a copy of Shell's EP, and their has been no apparent attempt by MMS to "ensure that potential threats to polar bears are adequately addressed and mitigated, based on the most current knowledge regarding their habitat use, distribution, and population status".

For the Proposed Action, the chance of one or more large spill occurring, based on OSRA analysis, is low (Appendix II). If a large oil spill does occur during the open water period, there is as much as a 15% chance that the oil would contact the islands around Kaktovik (ERA 15-16) within 30 days, based on OSRA analysis. Similarly, there is as much as a 4% chance that an oil spill would contact Cross Island (ERA 6) within 30 days (Appendix II). If a large oil spill does occur, there is as much as a 49% chance that the oil would contact the coast of ANWR (LS's 43-51) within 30 days (Appendix II).

According to the multiple-sale EIS, ITL No. 11, Information on Sensitive Areas to be Considered in the Oil-Spill Contingency Plans,:

> …may provide some protection, at least in theory, for nonendangered marine mammal sensitive habitats that are listed in the ITL. The lessees are informed that these areas should be protected in the event of an oil spill. However, it is unlikely that oil-spill-protection and -cleanup measures would prevent a large spill from contacting these marine mammal habitats, if wind and ocean currents were driving the spill into these areas (USDOI, MMS, 2003:Sec. IV.C.7.a(2)(c)(2)).

However, depending on the location of the activity and time of year, prestaging oil spill response equipment at Cross Island, Kaktovik, offshore facilities, or other locations would allow a quicker response to any spills which occur and could greatly reduce the chance that an oil spill would enter a sensitive area, such as Bernard Harbor, and oil polar bears there..

The multiple-sale EIS also stated that:

> The MMS encourages initiatives to train village oil-spill-response teams as a way of guaranteeing local participation in spill response and cleanup; this effort allows local Native communities to use their traditional knowledge about sea ice and the environment in the response process. Within the constraints of Federal, State, and local law, operators and Alaska Clean Seas would be encouraged to hire and train residents of the North Slope Borough and the Cities of Barrow, Nuiqsut, and Kaktovik in oil-spill response and cleanup (USDOI, MMS, 2003:Sec. IV.C.16.e(2)).

The multiple-sale EIS goes on to say that:

> Other potential mitigation available if activity occurs includes potential staging of oil-spill equipment at critical locations to support any necessary oil-spill-cleanup operations. This initiative would address response-readiness concerns of subsistence users. Also, the staging of boom material and other pertinent response equipment at Barrow, Cross Island, and Kaktovik would provide protection to critical whaling areas and shoreline. These measures could be

included in the oil-spill-contingency plan or in the final Condition of Permit approval letter for a production project issued by the Regional Supervisor for Field Operations (USDOI, MMS, 2003:Sec. IV.C.16.e(2)).

These initiatives were incorporated into the new ITL "Planning for the Protection of Polar Bears" (Sec. III.C.2).

Considering the distances involved and the vagaries of the weather along the Beaufort Sea coast, personnel and equipment based in Prudhoe Bay may be unable to respond to oil spills in the Barter Island area and points east in a timely and efficient manner. Equipment and trained crews need to be positioned to respond to a spill as soon as it is discovered. The MMS has acknowledged that there are difficulties in effective oil-spill response in broken ice conditions. The MMS advocates the use of nonmechanical methods of spill response, such as in-situ burning, during periods when broken ice would hamper an effective mechanical response. However, there is a limited window of opportunity (or time period of effectiveness) to conduct successful burn operations. The type of oil, prevailing meteorological and oceanographic conditions and the time it takes for the oil to emulsify define that window. For example, once spilled, oil begins to form emulsions, and when water content exceeds 25%, most slicks are unignitable. Requirements to prestage oil-spill-response equipment would help ensure adequate geographic spill response coverage and timely oil spill response.

This review of new information modifies the multiple-sale conclusion that the effects from the proposed action could result in the loss of perhaps 6-10 polar bears, with recovery of populations within about a year (USDOI, MMS, 2003:Sec. IV.C.7.a(2)(c)(2)). As a result of the new information considered here, we conclude that if an offshore oil spill occurred, a potentially significant impact to polar bears could result, particularly if areas in and around polar bear aggregations were oiled. This is because the biological potential for polar bears to recover from any perturbation is low due to their low reproductive rate (Amstrup, 2000).

The MMS regulations are designed to reduce such impacts by requiring specific mitigation measures for specific exploration and development activities. Prior to commencement of exploration activities, proposed activities are supposed to be analyzed on a case-by-case basis and effective mitigation measures developed accordingly, based on the latest polar bear-population estimates, distribution information, other research results, and the location and timing of the activity. However, that has not happened in this case, even though Shell plans to drill approximately 15 miles offshore of Kaktovik in Camden Bay.

In summary, documented impacts to polar bears to date in the Beaufort Sea by the oil and gas industry appear minimal. Due primarily to increased concentrations of bears on parts of the coast, the relative oil-spill risk to the population has increased since preparation of the multiple-sale EIS. Due to the threats posed to coastal polar bear aggregations from an oil spill during the fall open water period, and because Shell has provided nothing in their EP or ODPCP that addresses potential threats to polar bears, or even indicates that they considered polar bears in their planning process, our overall finding is that the Proposed Action has the potential to significantly impact polar bears in the event of a large oil spill.