FINAL BIOLOGICAL OPINION

for

Minerals Management Service

and their agents

BP Exploration (Alaska) Inc.

LIBERTY DEVELOPMENT PROJECT

OCTOBER 2007

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1. INTRODUCTION

This document is the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) on the Minerals Management Service's (MMS) proposal to authorize BP Exploration (Alaska) Inc.'s (BP Alaska) Liberty Development Project. This project will use Ultra Extended Reach Drilling (uERD) technology to extract hydrocarbons from the Liberty field in the Beaufort Outer Continental Shelf (Beaufort OCS) region. The project will involve the expansion of the existing Endicott Satellite Drilling Island (Endicott SDI) to house the drill rig and associated equipment, and development of a new material site. The project will utilize existing roads, pipelines, and Endicott production facilities.

This BO describes the effects of these actions on spectacled (*Somateria fischeri*) and Alaska-breeding Steller's *(Polysticta stelleri*) eiders, which are listed as threatened under the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et. seq.). As requested by MMS, effects to the candidate species Kittlitz's murrelet *(Brachyramphus brevirostris*) have also been considered. Polar bears (*Ursus maritima*), a proposed species, are being considered in a separate conference.

This BO was prepared using information in the "Biological Assessment for Spectacled and Steller's Eiders the Liberty Development Project" (BP Alaska 2007), supplemental information from MMS, BP Alaska's Environmental Impact Assessment (EIA), and the Liberty Development and Production Plan. MMS's letter requesting formal consultation, and designating BP Alaska as their non-Federal representative, was received on May 31, 2007. On June 20, 2007 the Service confirmed that sufficient information to begin formal consultation had been provided. The complete administrative record of this consultation is on file at the Service's Fairbanks Fish and Wildlife Field Office.

Section 7(a)(2) of the Act states that Federal agencies must ensure their activities are not likely to:

- Jeopardize the continued existence of any listed species; or
- Result in the destruction or adverse modification of designated critical habitat.

After reviewing the information provided, the status of the species, the environmental baseline, and cumulative effects, the Service concludes that the proposed activities may adversely affect listed eiders but will not jeopardize either species or adversely modify critical habitat. The Service has determined that it is unlikely that the action will violate section 7(a)(2) of the Act. To arrive at this non-jeopardy determination, we used a four-step approach for applying section 7(a)(2) standards. These steps were:

1. Define the biological requirements and current status of listed eiders;
2. Evaluate the relevance of the environmental baseline to the current status of listed eider populations;
3. Determine the effects of the proposed or continuing action on the species; and
4. Determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages.

Although limited information currently exists regarding the specific distribution of Kittlitz's murrelets, this species does not regularly occur in the action area. Hence the Service concludes the Liberty project is not likely to pose a significant threat for this species.

In addition to listed eiders, the Beaufort OCS, and Alaska's North Slope may now or hereafter contain plants, animals, or their habitats determined to be threatened or endangered. The Service, through future consultation may recommend alternatives to future developments within this area to prevent activity that will contribute to a need to list such a species or their habitat. The Service may require alternatives to proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of designated or proposed critical habitat. MMS should not approve any activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Act, including completion of any required procedure for conference or consultation.

2. DESCRIPTION OF THE PROPOSED ACTION

2.1 Background

Section 7(a)(2) of the Act requires Federal agencies to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat. When actions of a Federal agency may adversely affect a protected species, that agency (i.e., the action agency) is required to consult with either the National Marine Fisheries Service (NMFS) or the Service, depending upon the protected species that may be affected.

For the actions described in this document, the action agency is the Minerals Management Service (MMS). MMS will be authorizing activities described in this BO, which is the federal nexus for consultation. This BO focuses on the potential effects of the proposed project on the threatened Alaska-breeding Steller's (*Polysticta stelleri*) and spectacled (*Somateria fischeri*) eiders, and the candidate species Kittlitz's murrelet (*Brachyramphus brevirostris*).

2.2 Action Area

The action area is the area in which direct and indirect effects of the proposed action may occur. Liberty project activities, and hence direct effects, will occur at the Endicott Satellite Drilling Island (Endicott SDI), the Endicott Main Production Island (Endicott MPI), along the causeway that joins these two facilities, at a new mine site near Duck Island Material site, and along transportation routes (ice and gravel roads) connecting these facilities (Figure 2.1). No indirect effects outside the immediate construction and operations areas and along transportation corridors are anticipated.

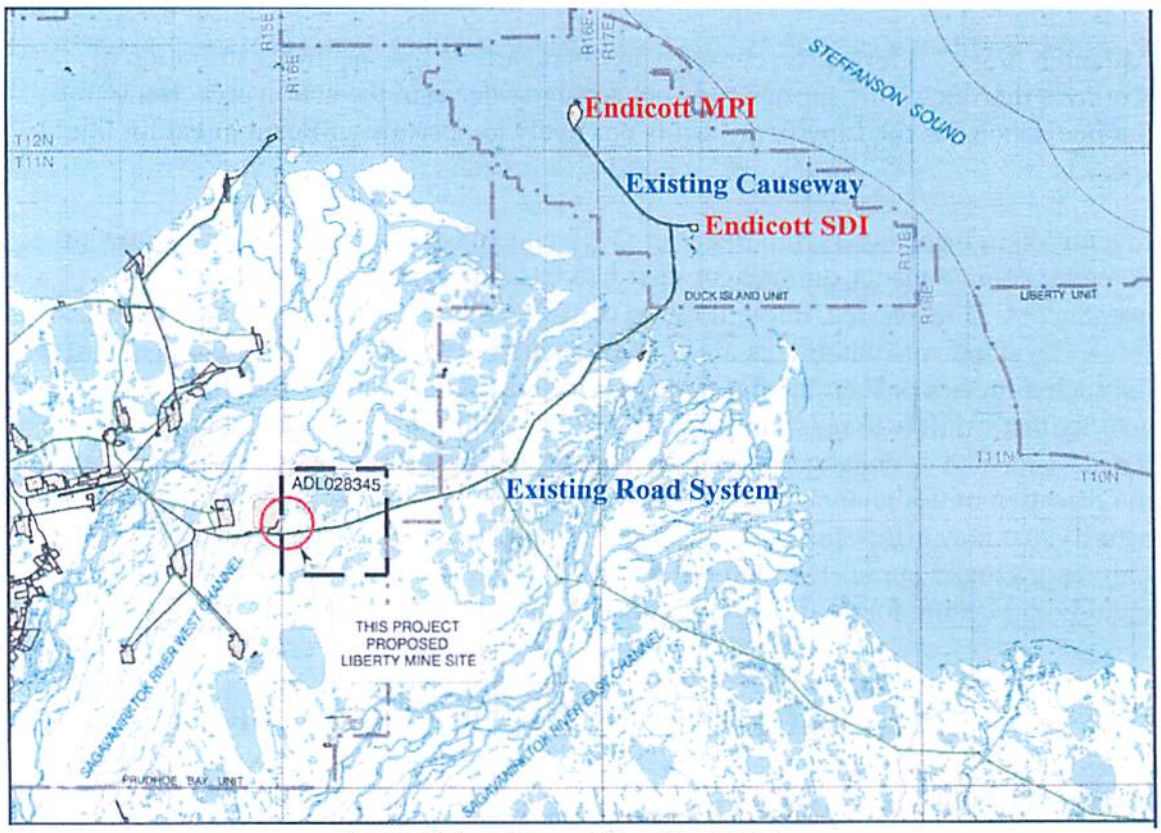

Figure 2.1 – Map of the Project Area

2.3 Project Actions

The project will develop infrastructure to extract an estimated 105 million barrels of hydrocarbons from the Liberty oilfield in federal waters of the Beaufort Sea. The project will involve:

- Development of a material site to supply gravel for expansion of Endicott SDI, and transportation of gravel via ice roads;
- Upgrades to the existing West Sag River Bridge;
- Construction of a purpose-built drill rig;
- Expansion of the Endicott SDI to accommodate the drill rig and associated facilities;
- Construction of pipelines, a LoSal™ facility, and upgrades to existing facilities in the Endicott area;
- Drilling production and injection wells using uERD methods;
- Hydrocarbon production; and
- Abandonment.

BP Alaska anticipates construction will commence in January 2009 with development of the material site. Snow and overburden will be cleared and stockpiled at the site, before gravel is mined and transported to the Endicott SDI expansion area via a specially constructed ice road. Mine site activities are expected to disturb 37 acres of habitat through the extraction of 870,000 cy of gravel. Gravel hauling will continue through April, with compaction of the gravels at Endicott SDI commencing in June/July. A new

sheet pile wall for slope protection will then be placed from the north side of the island around to the southeastern corner for ice and erosion protection.

The Liberty project would expand the 11 acre Endicott SDI on its eastern and southern sides adding an additional 20 acres of working area. Located in waters 4-11 feet deep, the seafloor footprint of the island will increase from 20 to 40 acres. Drilling supplies and equipment will be stored on the expansion area in support of a single row of wells and the uERD drill rig (Figure 2.2).

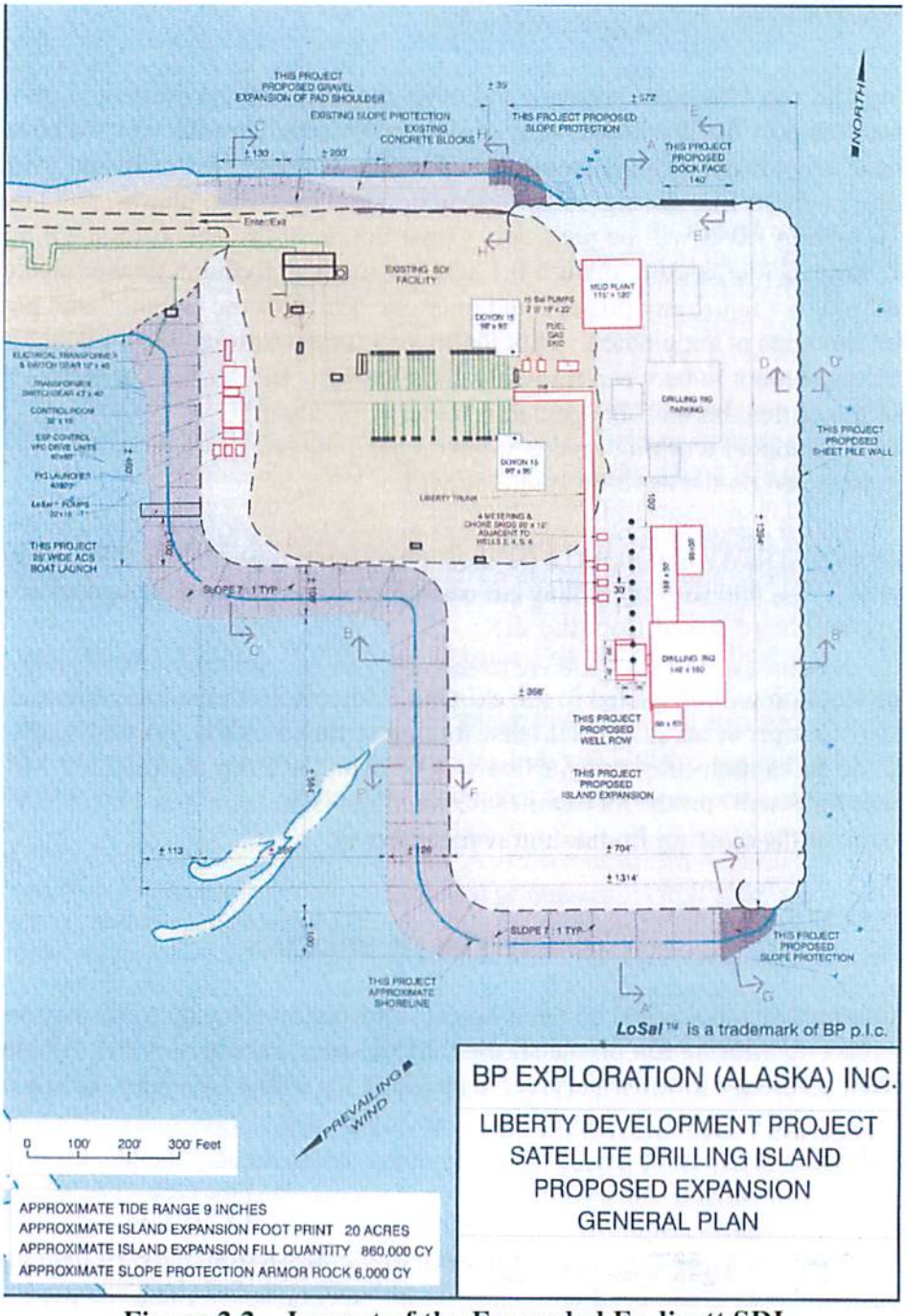

Figure 2.2 – Layout of the Expanded Endicott SDI

Surface facilities on the island will include:

- Pipe rack and well tie-in piping;
- Fuel-gas conditioning unit;
- Booster pumps for high-salinity water injection;
- Electrical transformer and switchgear;
- Control room;
- Transformer module for the electrical submersible pump variable frequency drive (ESP VFD);
- LoSal™ pipeline pig-launcher module; and
- LoSal™ EOR process injection pumps.

The piping, dill rig, LowSal™ system, and other modules will be fabricated offsite and transported to a port facility in southern Alaska, before each module is trucked to the project site. The Liberty project would significantly increase the traffic and vehicular loads to the Endicott SDI during both construction and operation phases, and the bridge over the West Sag River will be replaced. Construction of the new bridge will take place in winter, and is anticipated to disturb 0.1 acres of tundra. Regularly scheduled air traffic is not required by the Liberty project, and only one sealift of the LoSal™ and power generation modules is anticipated. This sealift will transit through the Chukchi and Beaufort Seas sometime between mid-July and October. BP Alaska states "the sealift will avoid the critical habitat for spectacled eiders in Ledyard Bay." Additional camp facilities for personnel working on the project during the construction and drilling phases will be constructed on the existing Endicott MPI.

Drilling is expected to begin in early 2010. Production will follow the hook up of the first well in early 2011, and drilling operations should be completed by the end of 2013, when the drill rig will be removed from the site.

Liberty production will be routed to the existing Endicott SDI pipeline system and on to Endicott MPI for processing and final distribution to the sales line. A new LoSal™ water injection line and a high-pressure gas line will be installed from the Endicott MPI to the SDI. These lines will run the three miles between the islands on new elevated VSMs on the west side of the existing Endicott gravel causeway.

3. STATUS OF SPECIES

This section presents biological and ecological information relevant to formation of the BO. Appropriate information on the species' life history, habitat and distribution, and other factors necessary for their survival is included for analysis in later sections.

Spectacled Eider

Physical Appearance

Spectacled eiders are large sea ducks. Males in breeding plumage have a white back, black breast, and pale green head with large white "spectacles" around the eyes. In late

summer and autumn males molt into a mottled brown plumage that lasts until late fall, when they re-acquire breeding plumage. Females are mottled brown year round, with pale tan spectacles. Juveniles attain breeding plumage in their second (female) or third (male) year; until then they are mottled brown (Petersen et al. 2000). Both males and females have long sloped bills, giving them a characteristic profile (Figure 3.1).

Figure 3.1 - Male and female spectacled eiders in breeding plumage.

Distribution and Status

Spectacled eiders inhabit the North Pacific. There are three primary breeding populations; those on Alaska's North Slope, the Yukon-Kuskokwim Delta (Y-K Delta), and northern Russia. The entire species was listed as threatened on May 10, 1993 (Federal Register 58(88):27474-27480) because of documented population declines. The Y-K Delta population had declined 96% between the 1970s and early 1990s (Stehn et al. 1993, Ely et al. 1994), and anecdotal information indicated that populations in the other two primary breeding areas had also declined (USFWS 1996).

Birds from all three breeding populations molt in a number of discrete areas (Figure 3.2), with birds from the different populations and genders apparently favoring different molting areas (Petersen et al. 1999). After molting, spectacled eiders migrate to openings in pack ice of the central Bering Sea south/southwest of St. Lawrence Island (Petersen et al. 1999) (Figure 3.2). Spectacled eiders depart from the wintering area in March and April to begin migration back to their breeding grounds (Lovvorn et al. 2003).

Distribution of spectacled eiders. Molting areas (green) are used July through October. Wintering areas (yellow) are used October through April. The full extent of molting and wintering areas is not yet known, and may extend beyond the boundaries shown.

Figure 3.2 - Distribution of spectacled eiders (USFWS 2002a).

North Slope Breeding Population

Spectacled eiders arrive on their North Slope breeding grounds in late May and early June. Nest initiation is thought to occur in the third week of June (Petersen et al. 2000). Incubation lasts 20-25 days (Kondratev and Zadorina 1992, Harwood and Moran 1993, Moran and Harwood 1994, Moran 1995), and hatching occurs from mid-to late July (Warnock and Troy 1992). Ducklings leave the nest 1-2 days after hatching (Petersen et al. 2000).

On the nesting grounds, spectacled eiders feed on mollusks, insect larvae (craneflies and caddisflies), midges, small freshwater crustaceans, and plants and seeds (Kondratev and Zadorina 1992) in shallow freshwater or brackish ponds, or on flooded tundra. Young fledge approximately 50 days after hatch, when females with broods move directly from freshwater to marine habitats.

Spectacled eider density varies across the North Slope (Figure 3.3). Aerial surveys targeting eiders have been conducted annually by the Service since 1992. Data from these surveys suggests the population was stable between 1993 and 2006, with an average (n=14) annual growth rate of 0.997 (0.978-1.016 90% C.I.). The most recent (2002-2006) population index[1] for North Slope breeding spectacled eiders is 6,458 (5,471-7,445 95% CI). This index was adjusted by a factor that accounts for the number of nests missed during aerial surveys[2] (developed for the Y-K Delta) and used to calculate a North Slope breeding spectacled eider population estimate of 12,916 (10,942-14,890 95% CI) (Stehn et al. 2006). Of these birds only an estimated 1.93% were observed east of the Endicott SDI (Service data).

Molt Migration

Males generally depart breeding areas when the females begin incubation in late June (Anderson and Cooper 1994, Bart and Earnst 2005). Use of the Beaufort Sea by departing males is variable. Some appear to move directly to the Chukchi Sea over land, while the majority moved rapidly (average travel of 1.75 days), over nearshore waters from breeding grounds to the Chukchi Sea (TERA 2002). Of 14 males implanted with satellite transmitters, only four spent an extended period of time (11–30 days), in the Beaufort Sea (TERA 2002). Preferred areas for males appeared to be near large river deltas such as the Colville River where open water is more prevalent.

Females generally depart the breeding grounds later, when much more of the Beaufort Sea is ice-free, allowing for more extensive use of the area. Females spent an average of two weeks in the Beaufort Sea (range 6-30 days) with the western Beaufort Sea the most heavily used (TERA 2002). Females also appeared to migrate through the Beaufort Sea an average of 10 km further offshore than the males (Peterson et al. 1999). This migration route and the greater use of the Beaufort Sea by females were attributed to ice extent by Peterson et al. (1999) and TERA (2002). The more prolonged use and greater distance offshore were thought to result from the decreased sea ice later in summer when females migrate through the region (Peterson et al. 1999, TERA 2002).

Causes of Population Decline

Although causes of spectacled eider population decline are unknown, factors that affect adult survival may be the most influential on population growth rate. These include lead poisoning from ingested spent shotgun pellets, which may have contributed to the rapid decline observed in the Y-K Delta (Franson et al. 1995, Grand et al. 1998), and other factors such as over harvest, disturbance, and collisions with human-built structures. Productivity may also be impaired by habitat loss and increased nest predation.

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[1] A standard index used to monitor waterfowl populations based on the number of birds seen during aerial surveys and adjusted for cryptic females that are presumably missed when single males are detected (USFWS and Canadian Wildlife Service 1987).

[2] The detection correction factor compares the number of eiders observed during aerial surveys with the number of nests located on ground surveys in order to presume actual population size from the number detected in aerial surveys.

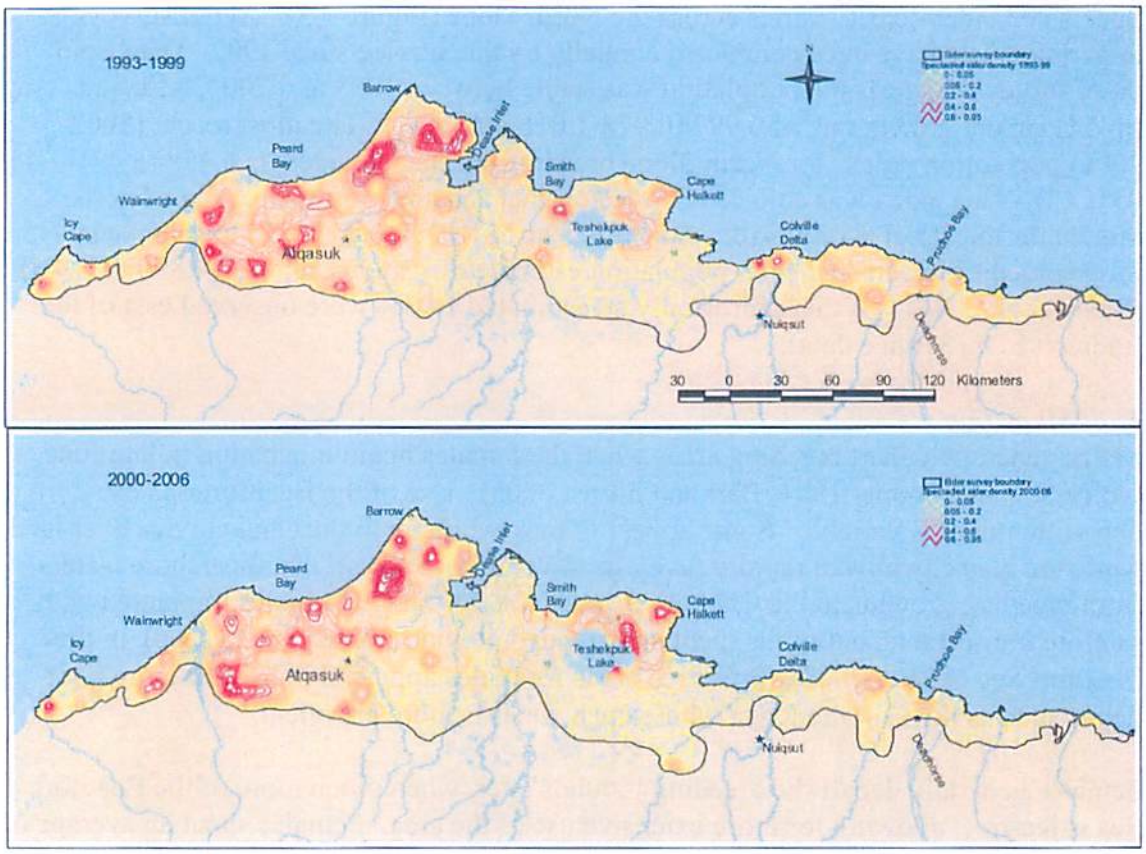

Figure 3.3 - Spectacled eider density on the Alaska ACP from 1993-1999 and 2000-2006 (Larned et al. 2006).

Steller's Eider

Physical Appearance

The Steller's eider is the smallest of the four eider species. From early winter until mid-summer males are in breeding plumage - black back, white shoulders and sides, chestnut breast, white head with black eye patches and a greenish tuft (Figure 3.4). During late summer and fall, males molt to dark brown with a white-bordered blue wing speculum; this plumage is replaced during the autumn molt when males re-acquire breeding plumage, which lasts through the next summer. Females are dark mottled brown with a blue wing speculum year round. Juveniles are dark mottled brown until the fall of their second year, when they acquire breeding plumage (Fredrickson 2001).

Figure 3.4 - Male and female Steller's eider in breeding plumage.

Distribution and Status

Steller's eiders are a circumpolar sea duck with both Atlantic and Pacific populations. The Pacific population is further divided into the Russian-breeding population and the Alaska-breeding population. On June 11, 1997, the Alaska-breeding population of Steller's eiders was listed as threatened based on a substantial decrease in this population's breeding range and the increased vulnerability of the remaining Alaska-breeding population to extirpation (Federal Register 62(112):31748-31757). Although population size estimates for the Alaska-breeding population were imprecise, it was clear Steller's eiders had essentially disappeared as a breeding species from the Y-K Delta, where they had historically occurred in significant numbers, and that their Arctic Coastal Plain (North Slope) breeding range was much reduced. On the North Slope they historically occurred east to the Canada border (Brooks 1915), but have not been observed on the eastern North Slope in recent decades (USFWS 2002b). The Alaska-breeding population of Steller's eiders now nests primarily on the North Slope, particularly around Barrow and at very low densities from Wainwright to at least as far east as Prudhoe Bay (Figure 3.5). A few pairs remain on the Y-K Delta, with 9 nests found in the last 14 years (Service, unpublished data).

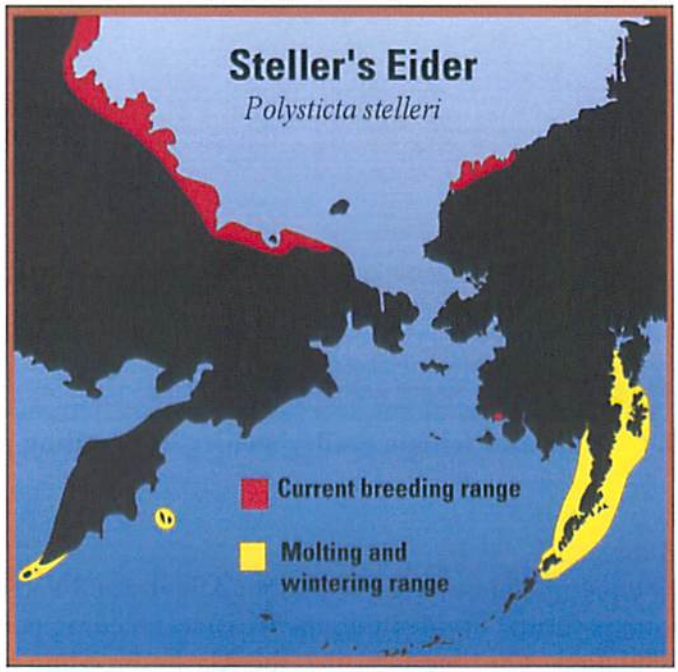

Figure 3.5 - Steller's eider distribution in the Bering and Chukchi Seas (USFWS 2002b).

After the breeding season, Steller's eiders move to marine waters where they undergo a complete flightless molt for about 3 weeks. The combined Pacific wintering population (which includes populations that breed in eastern Russia and Alaska) molts in numerous locations in southwest Alaska, with exceptional concentrations in four areas along the north side of the Alaska Peninsula: Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands (Gill et al. 1981, Petersen 1981, Metzner 1993). After molting, many of the Pacific-wintering population of Steller's eiders disperse to the eastern Aleutian Islands, the south side of the Alaska Peninsula, and as far east as Cook Inlet, although thousands may remain in lagoons used for molt unless or until freezing conditions force them to move (USFWS 2002b). Prior to spring migration, thousands of Steller's eiders stage in estuaries along the north side of the Alaska Peninsula, including some molting lagoons, and at the Kuskokwim Shoals near the mouth of the Kuskokwim River in late May (Larned 2005, Martin et al. *in prep.*).

North Slope Breeding Population

Steller's eiders arrive in pairs on Alaska's North Slope in early June, but may be episodic breeders; since 1991, Steller's eiders near Barrow apparently nested in 9 years but did not nest in 7 years (Rojek 2006). Non-breeding years are common in long-lived eider species and are typically related to inadequate body condition (Coulson 1984), but reasons for Steller's eiders non-breeding may be more complex. In the Barrow area, Steller's eider nesting has been related to lemming numbers and other environmental cues; nest success could be enhanced in years of lemming abundance because mammalian predators are less likely to prey-switch to eider eggs and young, or because avian predators such as pomarine jaegers (*Stercorarius pomarinus*) and snowy owls (*Nyctea scandiaca*) that nest nearby (and consume abundant lemmings) may protect eider nests from mammalian

predators such as arctic fox (Quakenbush and Suydam 1999, and summarized by Rojek 2006).

Nest initiation dates for Steller's eiders at Barrow between 1991 and 2006 ranged from June 6 to June 28 (Rojek and Martin 2003, Rojek 2005, Rojek 2006). Male Steller's eiders typically leave the breeding grounds once females begin incubating. Incubation lasts between 24 (USFWS et al. 2002c) and 27 days (Fredrickson 2001), with hatching occurring from July 7 to August 3 (Quakenbush et al. 1998).

Hens move their broods to ponds with emergent vegetation, particularly *Carex* spp. (Rojek 2005) and *Arctophila fulva* (Quakenbush et al. 1998) soon after hatching. Here they feed on insect larvae and other wetland invertebrates. Fledging occurs 32-37 days after hatching (Obritschkewitsch et al. 2001, Rojek 2005). Females and fledged young depart the breeding grounds in early to mid-September.

Aerial surveys indicate that Steller's eiders occur at extremely low densities across most of the North Slope (Larned et al. 2006), with the highest densities occurring near Barrow (Figure 3.6). Because Alaska-breeding Steller's eiders occur at very low densities, there is not sufficient information to estimate population size or detect population trends. The mean 1992-2006 aerial-survey generated population index[3] was 116 (n=15, standard deviation [sd] = 204), but the range of indices in these years ranged from 20 (calculated in a year when no birds were seen) to 785 (Larned et al. 2006). The most recent index (2002-2006) was 112 (n=5, sd=98). However, aerial surveys likely undercount Steller's eiders for several reasons. An unknown number are simply missed when observers count from aircraft; this proportion varies by species and is unknown for Steller's eiders. Additionally, because observations at Barrow indicate that many Steller's eiders vacate nesting habitat early in non-nesting years, it is possible that aerial surveys fail to detect some individuals that were present early in the season, at least in some years. Further, the concentration near Barrow, which contains a significant proportion of Steller's eiders detected on the entire North Slope in most years, may be under-sampled because: 1) the scale of the concentration is too small to be adequately represented in the sampling regime; and 2) a portion of the concentration area is excluded from surveys because the area near the Barrow airport cannot be flown due to aviation safety concerns. Due to these biases, we cannot precisely estimate Steller's eider abundance on the North Slope, but the best available information leads the Service to estimate that roughly several hundred Steller's eiders occupy the North Slope in most years.

[3] We present only an index (no population abundance estimate, as with spectacled eiders) because no aerial survey-ground survey correction factor has been created for Steller's eiders on the North Slope.

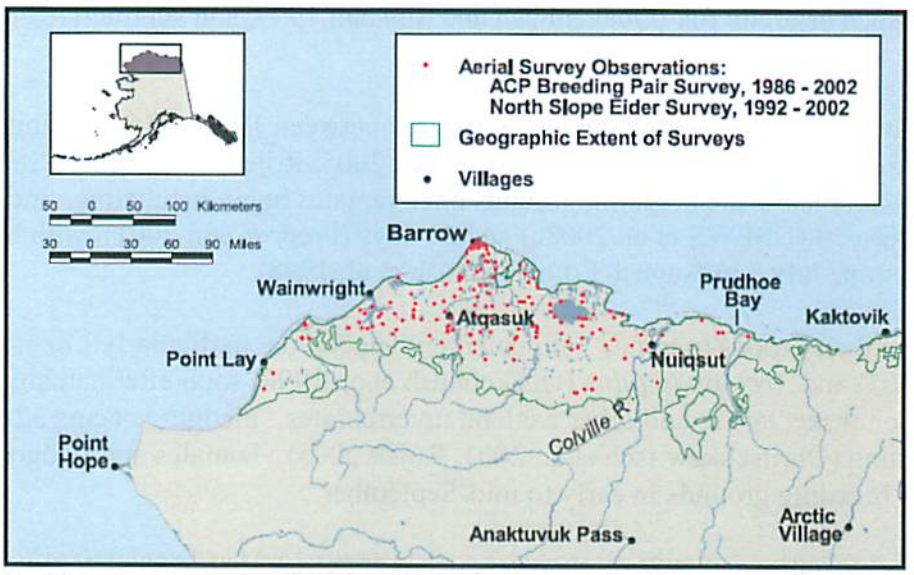

Figure 3.6 - Distribution of Steller's eiders from aerial surveys on the Arctic Coastal Plain, Alaska (USFWS 2002b).

Causes of Population Decline

When the Alaska-breeding population was listed as threatened, factors causing the decline were unknown, but potential causes identified were predation, over hunting, ingestion of spent shot in wetlands, and changes in the marine environment. Since listing, other potential threats have been identified; including exposure to oil or other contaminants near fish processing facilities in southwest Alaska, but causes of decline and obstacles to recovery remain poorly understood.

Kittlitz's Murrelet

Physical Appearance

Kittlitz's murrelets are small diving seabirds in the family Alcidae (including puffins, guillemots, and murres) which inhabit Alaskan coastal waters. Breeding plumage is mottled golden-brown and winter non-breeding plumage is more distinct, with a white underbelly and face and dark back and chest band.

Distribution and Status

Kittlitz's murrelets are often found in association with marine tidewater glaciers and glacial-influenced water and in protected fiords (Kuletz and Piatt 1992, Day and Nigro 1998). In the eastern Pacific and Arctic areas they range from Taku Inlet in Southeast Alaska north to about Point Barrow in the Chukchi Sea. The species has not been recorded in the Beaufort Sea (Divoky 1984, Johnson and Herter 1989), but it is possible they occur there in small numbers. The entire North American population occurs in Alaskan waters, migrating between offshore waters in winter and nearshore waters in summer, which are presumably near breeding areas (Fig. 3.7). Kittlitz's murrelets possibly nest as far north as Cape Sabine and Cape Beaufort on the Chukchi Sea coast.

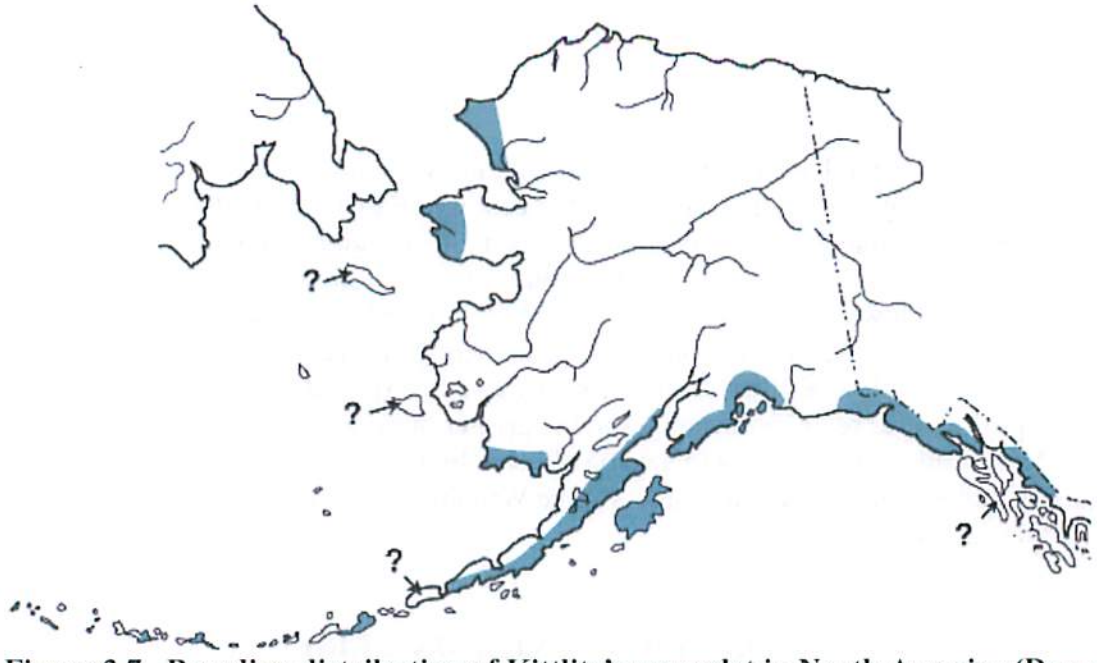

Figure 3.7. Breeding distribution of Kittlitz's murrelet in North America (Day et al. 1999).

Suitable nesting habitat is lacking north of Cape Beaufort, so the species rarely occurs and probably does not breed north of there (Huey 1931, Bailey et al 1933, Bailey 1948, Pitelka 1974).

Both the timing and migration routes to and from the breeding grounds are unknown. It is likely that Kittlitz's murrelets follow the retreating ice edge, feeding on invertebrates associated with ice plankton blooms. There is no information on migration routes.

The Kittlitz's murrelet's winter range is poorly known. Only 31 have been seen on Alaska Christmas Bird Counts from 1967 to 1997, suggesting most leave protected bays and go to sea during winter.

The Kittlitz's murrelet is thought to be one of the rarest seabirds in North America, with a total population estimate of 9,000-25,000 birds. Surveys indicate significant population declines have occurred in three core areas: 84% in Prince William Sound since 1989; 38-75% near Malaspina Glacier; and a rate of decline that could result in extinction in 40 years in Glacier Bay. On May 4, 2004, the Kittlitz's murrelet was designated a candidate for protection under the Act because of its sharply declining numbers, indicating the species warrants listing as threatened or endangered (Federal Register 69(86):24875-24904).

Diet and Feeding

Principle summer foods are thought to be small fishes and macro-zooplankton; winter foods are unknown, although the stomach of one museum specimen contained macro-zooplankton (Day et al. 1999). This species has been documented to forage extensively in turbid waters near tidewater glaciers and near glacier-fed streams as well as within

clear water areas. Kittlitz's murrelets forage singly or in small groups during the day and night (Day et al. 1999).

Population and Causes of Decline
The causes of decline in Kittlitz's murrelets are not known, but may be related to the retreat of tidewater glaciers since the turn of the century. Exactly how glacier retreat might affect the murrelets is unknown, but studies in other regions have recorded low biological productivity in fjords with receding glaciers as a result of increased sedimentation and lowered salinity (Day et al. 1999). Lowered productivity could result in fewer forage fish, or sedimentation that affects feeding efficiency. In addition to changes in fjord habitats, Kittlitz's murrelets may also be affected by changes in their available prey species relative to changes in the greater marine environment (Kuletz 2004). The Kittlitz's murrelet could also be affected by increased marine traffic and tourist helicopter flights in Kenai Fjords, Prince William Sound, and Yakatak and Glacier bays (Kuletz 2004).

4. ENVIRONMENTAL BASELINE

The environmental baseline provides an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, their habitat, and ecosystem in the action area.

Spectacled and Steller's Eiders

Spectacled and Steller's eiders may be present in the action area from late May through approximately late October. Both species nest on Alaska's North Slope between early June and September, and individuals migrate through the Beaufort Sea from May through the end of October. Both species have undergone significant, poorly explained declines in their Alaska-breeding populations. Factors in the action area that may have contributed to the current status of spectacled and Steller's eiders are discussed below and include, but are not limited to, toxic contamination of habitat, increase in predation, and habitat loss through development and disturbance.

Toxic Contamination of Habitat
The deposit of lead shot in tundra or nearshore habitats used for foraging is a threat for spectacled and Steller's eiders. Lead poisoning of spectacled eiders has been documented on the Y-K Delta (Franson et al. 1995, Grand et al. 1998) and in Steller's eiders on the North Slope (Trust et al 1997; Service unpublished data). Use of lead shot for hunting waterfowl is prohibited statewide, and for hunting all birds on the North Slope. Outreach programs are being undertaken to reduce any lingering illicit use of lead shot that may be occurring on the North Slope, and hunting does not occur in the action area due to the proximity of oil field infrastructure.

Water birds in arctic regions are also exposed to global contamination, including radiation and industrial and agricultural chemicals that can be transported by atmospheric

and marine transport. Twenty male spectacled eiders wintering near St. Lawrence Island examined for the presence and effects of contaminants apparently were in good condition, but had high concentrations of metals and subtle biochemical changes that may have long term effects (Trust et al. 2000).

Increase in Predator Populations
It has been speculated that anthropogenic influences on predator populations or predation rates may have affected eider populations, but this has not been substantiated. Steller's eider studies at Barrow suggest that high predation rates explain poor breeding success (Quakenbush et al. 1995, Obritschkewitsch et al. 2001). Researchers have proposed that reduced fox trapping, increased anthropogenic food sources in villages and oil fields, and nesting sites on human-built structures have increased fox, gull, and raven numbers (R. Suydam and D. Troy pers. comm., Day 1998), but the connection between these factors and increased predation rates has not been proven.

Habitat Loss through Development and Disturbance
With the exception of contamination by lead shot, destruction or modification of nesting habitat is not thought to have played a major role in the decline of spectacled or Steller's eiders. Until recently eider breeding habitat on the North Slope was largely unaltered by humans, but now limited portions of each species' breeding habitat has been altered by community and industry growth leading to wetland fill, material site development, the presence of structures that present collision risk, and other human activities that may disturb birds or increase populations of predators.

Kittlitz's Murrelet

Kittlitz's murrelets are closely associated with marine tidewater glaciers, and their decline may be related to the retreat of glaciers and decreased foraging habitat. Boat tours of tidewater glaciers have increased substantially in southeast Alaska, and this may be increasing disturbance of Kittlitz's murrelets in foraging areas. The primary distribution and breeding range of Kittlitz's murrelets occurs in southeast Alaska, outside of the action area. Activities in the action area are not thought to be impacting the decline, or recovery, of this species.

5. EFFECTS OF ACTION ON LISTED SPECIES

This section of the BO provides an analysis of effects of the action on listed species and critical habitat. Both direct effects, i.e., those immediately attributable to the action; and indirect effects, i.e., those caused by the action but which will occur later in time, are considered. Finally, interrelated and interdependent effects of the action are discussed.

Direct Effects
MMS identified the following potential impacts to listed eiders from the Liberty project:

A. Habitat Loss
B. Disturbance
C. Collisions
D. Increased Predation
E. Oil Spills

A. Habitat Loss
The Liberty project would expand the seafloor footprint of Endicott SDI by approximately 20 acres. The expansion area is located in water with a depth of 4 to 11 feet which is within the depth range for eiders feeding on mollusks and other invertebrates. Although the expansion may result in the loss of some marine feeding and staging habitat, the Service does not consider this type of habitat to be limiting for listed eiders in the Beaufort Sea. In addition, available satellite telemetry data do not suggest this area is heavily used by listed eiders (TERA 2002, Peterson 1999). Therefore, the loss of this small area of habitat is not likely to adversely affect listed eiders.

Gravel mining and transportation will result in the loss of nesting habitat for spectacled and Steller's eiders. BP Alaska intends to mine an estimated 860,000 cy of gravel from a new material site adjacent to the Duck Island Mine Site. Organic and non-organic overburden will be stripped and stockpiled separately. Gravel will then be removed and transported to the construction sites via ice and gravel roads. A berm will be constructed around the excavated area to prevent flooding during spring and summer while the pit remains active. MMS estimates activities at the material site will disturb 37 acres.

The new mine site is on a raised gravel bench close to the Sagavanirtok River, adjacent to the existing Endicott Road (Figure 5.1). Multiple years of Service aerial survey data indicate the proposed material site is in an area that supports a relatively low density of spectacled eiders (<0.1-0.6 birds/km^2) (Figure 5.2). Aerial photography suggests the proposed mine site is relatively dry, with polygonal ground and small ponds favored by nesting Steller's and spectacled eiders only present in the extreme northeast of the mine site. The proposed site is adjacent to the existing Endicott Road and Duck Island Material Site and is impacted by human activities in these areas, further reducing the habitat quality for eider nesting.

Figure 5.1 – Aerial photograph of the proposed material site, the existing Duck Island mine site, and the Endicott Road.

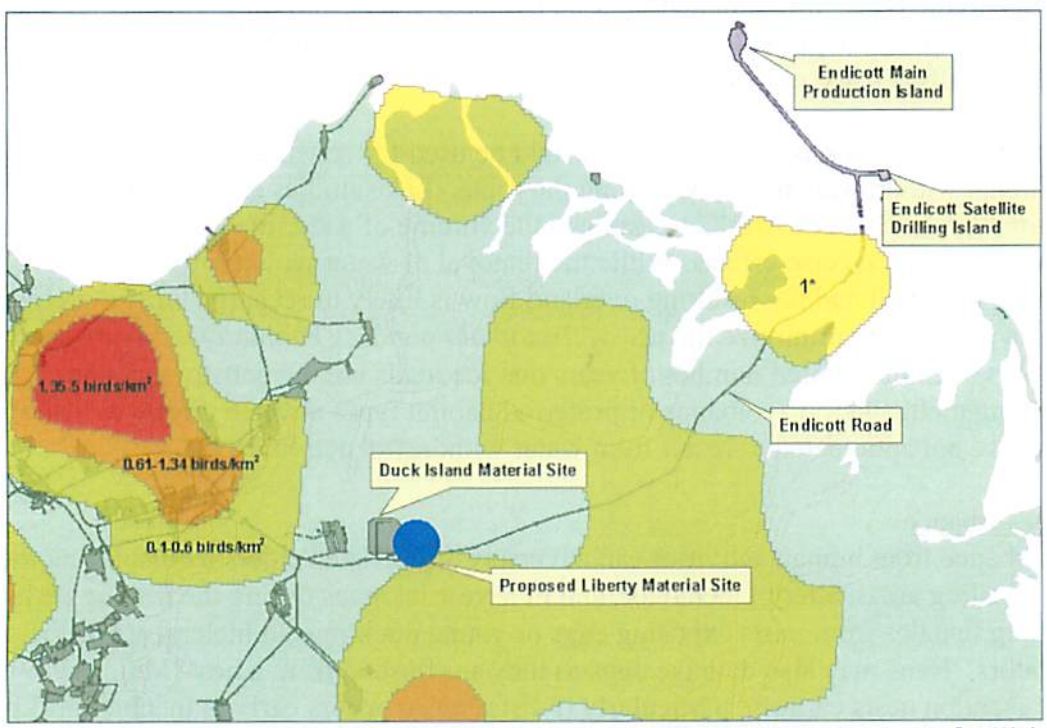

Figure 5.2 – Location of the proposed material site and existing Endicott facilities in relation to the average density of spectacled eiders/km^2 (Service data).

1* - The polygons were constructed using a kernel analysis technique and are intended to illustrate the approximate density of spectacled eiders over a large scale landscape.

BP Alaska has developed a preliminary reclamation plan for the material site. Overburden from the site will be used to form side slopes around the excavation area, the berm will be breached allowing the pit to slowly flood. Disturbed areas may have a layer of organic overburden placed over them before seeding with native grass. The rehabilitation plan aims to restore the area to functioning wetland habitat. Much of the site will be a deep water pond, with the remaining area vegetated slopes. Based on the proposed plan it is not clear if the reclaimed site will support nesting spectacled or Steller's eiders in the future.

BP Alaska intends to construct an ice road from the material site to the Endicott SDI. This road will allow the gravel-haul trucks direct access to the SDI without impacting normal traffic on the existing road system.

There have been several studies on the impacts of ice road construction to different tundra types. Overall, these studies have found that impacts from ice roads are low, with occasional areas of moderate level impacts (Pullman et. al. 2003). In one survey, damage occurred on higher, drier sites with little or no damage observed in wet or moist tundra areas (Payne et al. 2003, cited by Pullman et. al. 2003). Jorgenson (1999) found impacts were limited to isolated patches of scuffed high microsites and crushed tussocks. McKendrick (2003) studied several riparian willow areas and found that while branches were damaged the plants remained viable. As ice roads do not appear to cause significant damage to the types of tundra habitat used by listed eiders, and they will only be used for two years during the project construction phase, significant impacts to habitat that could adversely affect listed eiders are not anticipated.

Water from the Duck Island Mine Site would be used for constructing the ice road, with additional withdrawals from lakes along the route. Lake studies and permitting are required by the State of Alaska to estimate the volume of water that can be withdrawn without causing adverse effects. While the removal of water would lower water levels in lakes, spring melt and the resulting overland flow is likely to recharge these systems. BP Alaska proposes to minimize the use of *Arctophila* ponds, a habitat type favored by listed eiders. Given the limited number of years that ice roads will be constructed, the recharge by spring melt, and the avoidance of preferred habitat types adverse effects to listed eiders are not anticipated to result from water withdrawal activities.

B. Disturbance

Disturbance from human activities can adversely affect listed eiders by displacing them from feeding areas, altering behavior, and in terrestrial areas during the nesting period, flushing females from nests exposing eggs or young ducklings to inclement weather and predators. Hens may also damage eggs as they are flushed from a nest (Major 1989); and may abandon nests entirely, particularly if disturbance occurs early in incubation (Livezy 1980, Götmark and Ählund 1984).

Terrestrial
The majority of construction activities are scheduled to occur in winter when listed eiders are not present, so disturbance will not occur.

The Liberty development is likely to increase vehicle traffic on roads and the Endicott causeway system during all phases of the project. The behavioral response and tolerance of Steller's and spectacled eiders to disturbance likely varies by individual. Steller's eiders have been observed nesting and raising broods close to the Barrow airport, and spectacled eiders are known to nest close to the Deadhorse airport (Service data). Studies of spectacled eider responses to aircraft and construction activities at the Alpine oilfield suggests broods can be raised successfully close to areas with significant levels of disturbance (Johnson et al. 2006). Disturbance from the road system is regular and ongoing, possibly allowing sensitive individuals to move to other locations, and less sensitive individuals to become habituated. Therefore, the Service believes that disturbance from increased traffic and activity in the terrestrial portion of the action area is unlikely to result in adverse effects.

Marine
Disturbance from Liberty-associated traffic, machinery, facility noise, and pedestrians will occur on the Endicott SDI, expansion area, Endicott MPI, and along the causeway. While this on-going disturbance may displace listed eiders from an area around the Endicott/Liberty facilities, the impacted area is likely small in relation the size of the available marine habitat in the Beaufort Sea. The disturbance is relatively constant in intensity and space, possibly allowing birds to habituate to it, and is not anticipated to result in measurable adverse effects on either a population or individual level.

BP Alaska intends to conduct at least one sealift of equipment and supplies for the Liberty project. A barge would traverse the Chukchi and Beaufort Seas en route to the Endicott SDI, potentially disturbing listed eiders in these areas. The severity of a disturbance and displacement effect depends upon the duration, frequency, and timing of the disturbing activity. Along most of the route, barges may encounter small numbers of listed eiders and could temporarily displace them as the vessels move through the area. BP Alaska has committed to ensuring vessels do not enter the Ledyard Bay Critical Habitat Unit (LBCHU), where large numbers of flightless spectacled eiders molt. By avoiding the LBCHU, and given the very low number of vessel journeys through the area, no adverse effects are anticipated from the sea lift.

Oil spill response training activities using small boats may also be conducted in the vicinity of the SDI and other Endicott facilities. These activities may displace eiders from the immediate area, but other comparable habitat is available in the area.

As disturbance at Endicott SDI is on-going and there is comparable habitat available in the area, adverse impacts to the few listed eiders that may utilize the area are not anticipated.

C. Collisions

Migratory birds suffer substantial mortality from collisions with man-made structures (Manville 2004). Birds are particularly at risk of collision with objects in their path when visibility is impaired during darkness or inclement weather, such as rain, drizzle, or fog (Weir 1976). In a study of avian interactions with offshore oil platforms in the Gulf of Mexico, Russell (2005) found collision events were more common, and more severe (by number of birds) during poor weather. Certain types of lights (such as steady-state red) on structures increase collision risk (Reed et al. 1985, Russell 2005, numerous authors cited by Manville 2000). This is particularly apparent in poor weather when migrating birds appeared to get into circulation patterns around structures after being attracted to lights and becoming unable to escape the "cone of light" (Russell 2005, Gauthreaux & Belser 2002, Federal Communications Commission 2004). BP Alaska has offered to discuss lighting options for the rig structures with the Service.

Day et al. (2005) suggested that eider species may be particularly susceptible to collisions with offshore structures as they fly low and at relatively high speed (~ 45 mph) over water. Johnson and Richardson (1982), in their study of migratory behavior along the Beaufort Sea coast, reported that 88% of eiders flew below an altitude of 10 m and >50 % flew below 5 m.

The Liberty project would involve the construction and operation of a large drill rig (350' wide x 44' high with a 230' high derrick), pipe racks, LoSal™ plant and other equipment, control room, and support facilities on the expanded Endicott SDI and Endicott MPI. The expansion area will be protected by a vertical sheet pile wall. The wall and structures on the pad all pose a collision risk for listed eiders.

Two new pipelines will be constructed between the Endicott MPI and SDI; however, these pipes will run in parallel and at the same height as existing pipelines and should not increase avian collision risk. No additional collision risk is anticipated to result from construction and operation of a camp facility on the Endicott MPI as these buildings would be surrounded by existing buildings and structures.

BP Alaska and MMS also note that spectacled eider females with broods are known to cross roads (TERA 1996). BP Alaska anticipates an unspecified increase in traffic on the road, which increases the potential of vehicle/eider collisions. However, there is a very low density of listed eiders in the area, and many of the nests that are present fail before hatching. There is also an absence of data suggesting eider / vehicle collisions are occurring. Further, between July 1 and August 15 the speed limits on the Endicott road system are reduced from 45 mph to 35 mph to protect snow geese (BP Alaska 2007), likely decreasing collision risk for eiders. Therefore, given the low numbers of birds, the absence of data, and the additional protection of reduced vehicle speed, the Service concludes that collisions are unlikely to occur and adverse effects are not anticipated.

D. Increased Predation

No actions described in MMS's development scenario are likely to increase marine-based predators of either listed eider species.

In the terrestrial environment predator and scavenger populations may be increasing near sites of human habitation, such as villages and industrial infrastructure. Day (1998) conducted a comprehensive literature review examining four key predators of tundra-nesting birds. Day concluded that individual glaucous gulls, grizzly bears, arctic foxes, and common ravens had increased survival and reproductive success when additional anthropogenic food sources such as garbage dumps were available. A population increase in these species could affect listed eiders and other ground nesting avifauna through egg, young, and even adult predation.

Solid waste and garbage will be generated throughout the project. Although practices in the existing North Slope oil fields have not prevented predators and scavengers from accessing human wastes, recently oil-field operators have installed predator proof dumpsters, implemented new refuse handling techniques, and are educating their workforce on problems associated with feeding wildlife in an attempt to eliminate anthropogenic food sources that can support predators in the area. BP Alaska intends to implement these techniques to prevent wildlife accessing anthropogenic food and waste (BP Alaska 2007).

New infrastructure may also lead to an increase in the number of ravens in the area by providing suitable nesting substrate. Ravens appear to have expanded their breeding range on the North Slope by utilizing buildings and other manmade structures for nest sites (Day 1998). While there is little data describing ravens regularly depredating tundra-nesting birds, Day (1998) interviewed a number of biologists who work on the North Slope and many felt that ravens may be highly efficient egg predators. The Liberty project may create additional artificial nesting habitat on the drill rig, pipe racks, and other structures on the expanded Endicott SDI and MPI. BP Alaska has committed to search Liberty structures for raven nesting activities from March 1 through June 30 each year. Monitoring would take place every four days and if nesting materials are found they will be removed and disposed of to prevent their reuse by ravens. An annual report summarizing monitoring efforts will be provided to the Service by BP Alaska via MMS before December 31 each year.

Similarly, the flood protection berm, and stockpiles of organic overburden at the material site could provide den sites for foxes, conceivably allowing an increase in nest depredation. To ensure that predators of tundra-nesting birds do not benefit from these structures, BP Alaska intends to monitor the berm and stockpiles weekly from April 15 through June 15. If denning activities are observed the Alaska Department of Fish and Game and Service will be contacted to develop a plan to prevent further activity. An annual report summarizing monitoring efforts will be provided to the Service by BP Alaska via MMS before December 31 each year.

Based on the proposed operation and monitoring methods, the Service concludes that the Liberty Development Project will not result in an increase in the number or fitness of predators of listed eiders.

E. Oil Spills

The Service was not able to evaluate the Liberty Oil Discharge Prevention and Contingency Plan for this BO because it will not be completed until the end of 2007, when BPXA will submit an amended Endicott and Badami Oil Discharge Prevention and Contingency Plan. In the absence of a specific spill response plan, the Service made worst case-assumptions that predicted oil spills will be uncontrolled and unremediated, and that all listed eiders exposed to an oil spill will be killed.

Accidental hydrocarbon releases and associated clean-up activities could result from the proposed project. Oil or fuel products entering the environment can have significant impacts on waterfowl, including the listed eider species. Exposure to oil affects waterfowl in several ways. Waterbirds that have direct contact with even small amounts of oil or fuel products oil usually lose the water-proof properties of their feathers and become wet. They then become hypothermic and can die, particularly in cold environments (Hunt 1987, Piatt et al. 1990). Bird embryos are highly sensitive to petroleum. Mortality of embryos in incubating eggs and nestlings has also been documented by exposure to small amounts of hydrocarbon contamination (light fuel oil, certain crude oil, and weathered oil) transferred by adults with lightly oiled plumage (Parnell et al. 1984, Hoffman 1990, Szaro et al. 1980, and Stubblefield et al. 1995). Birds that ingest hydrocarbon contaminated food can experience both sublethal and lethal toxicological effects (Albers 2003, Peakall1982). Birds that feed on invertebrates or other organisms that can bioaccumulate or biomagnify hydrocarbons are vulnerable to both direct and sublethal toxic effects from a contaminated food supply (Albers 2003). As described previously in this BO, Steller's eiders and spectacled eiders feed on invertebrates in both marine and freshwater environments on the North Slope.

Several sources of fuel and crude oil spills are possible throughout the life of the Liberty project. These include small spills of refined product spills or crude oil, and large crude oil spills. The Liberty EIA (BP Alaska 2006) describes the risk and possible outcome of each type of spill, and the potential effect on listed eiders is evaluated below.

Small Crude Oil and Refined Product Spills

Using historical Alaska North Slope (ANS) data on small spills of crude oil and refined product from 1985 to 2006 (1,662 small crude oil spills, average volume 2.1 bbl; 5,456 product spills, average volume 0.8 bbls), the Liberty EIA predicts there will be approximately 16 small crude oil spills totaling 34 bbls (6-100 bbls 95% C.I.) over the life of the project, and 42 bbls of refined product will be spilled (10-125 bbls 95% C. I.), making no explicit prediction for the number of small product spills. The Liberty EIA also describes the ANS experience handling small spills (compared to large spills) indicating:

- Small spills are more likely to be contained on site;
- Small spills are more likely to be fully recovered;
- Small spills have a lower potential to produce significant adverse environmental impacts; and

- Small spills collectively account for only a small proportion of the total volume spilled.

In general the Service agrees the relative cumulative risk to listed eiders from exposure to small spills is likely to be very low.

Because small spills on land are usually more easily detected and contained, and the terrestrial density of spectacled eiders is relatively low in the project area, few individual spectacled eiders are likely to be exposed to oil if a small terrestrial spill were to occur. If a small spill were to occur in the marine environment, spectacled eider density in the marine environment is also very low; density in an aerial offshore survey (including the Liberty project area) was 0.04 birds per km^2 (Stehn and Platte 2000).

Likewise, annual eider aerial surveys suggest extremely low numbers of Steller's eiders nest on the eastern North Slope. During the 1999 and 2000 aerial surveys of the Liberty project area, no Steller's eiders were observed (Stehn and Platte 2000), so there is no indication that a large proportion of the Alaska-breeding Steller's eider population would encounter a small spill originating from the Liberty project.

Therefore, because small spills are low volume, and the density of both spectacled and Steller's eiders in the project area is very low, there is a correspondingly low likelihood that listed eiders would be affected by small spills in the marine environment. Thus the remainder of this evaluation focuses on large spills in the marine environment.

Large Crude Oil Spills

To conclude whether large marine spills might jeopardize the survival and/or recovery of spectacled eiders, the Service must consider the likelihood of one or more large spills occurring, and the likelihood that the spill(s) would affect or kill enough spectacled eiders to appreciably reduce the survival and recovery of the species.

The risk of large oil spills (defined for this analysis as >200[4] bbl) for the Liberty project was estimated based upon historical ANS crude and product spills for 1985 to 2006. There have been nine large (>200 bbl) spills on Alaska North Slope during the production of 11 billion bbls of crude oil. The Liberty project is expected to produce 105 million bbl over its lifetime. MMS provides estimated probabilities there will be 1, 2, or 3 large (200 bbl) crude oil spill over the life of the Liberty project as 7.8%, 0.3%, and <0.01%, respectively. Therefore, it can be concluded there is approximately an 8% probability that at least one large crude oil spill will occur during the Liberty project. The Liberty EIA analysis addressed the occurrence of a large crude oil spill anywhere on the facility and made no assumption regarding whether or not the spill reaches the water. The analysis also indicated the most likely volume of a large crude spill would be approximately 1,000 bbl (225 to 4,786 bbl, 95% confidence interval).

[4] MMS has frequently used 1,000 bbl as the threshold for a large spill. However, only one spill of that size has occurred on Alaska's North Slope since 1997. The Liberty FEIS used 500 bbl as the threshold of a large spill. Here 200 bbl was used to provide a statistically adequate sample size of large spills.

Stehn and Platte (2000) evaluated the exposure risk of birds to assumed oil spills from the Liberty project as it was previously designed (MMS and BP Alaska 2001). At that time BP Alaska proposed developing an offshore production island and a 4.6 mile subsea pipeline. Stehn and Platte's analysis estimated the average number of birds exposed to oil, and the proportion of the total bird population exposed to 500 modeled trajectories in July and August of a 5,912 bbl spill, and a 1,580 bbl spill from the Liberty project site. Although the current Liberty project presents even less risk of spill to the marine environment with the elimination of the production island and subsea pipeline, the analysis remains useful because it evaluates the potential exposure of marine birds to the current estimate of likely large spill volumes (up to about 4,786 bbl) in the immediate vicinity of the newly proposed project.

Stehn and Platte (2000) used bird studies in the Beaufort Sea for distribution information on sea ducks (including spectacled eiders), loons, and gulls during July and August in 1999 and 2000. These data were combined with simulated oil spill trajectories provided by MMS in a geographic information system to construct a spatial model overlaying bird density estimates with predicted trajectories of oil spill originating at the Liberty project. In the analysis, two chronic spill scenarios were modeled: a 1,580 bbl spill from a 30-day leak, and a 5,912 bbl spill resulting from a 60-day leak. No spectacled eiders were exposed to oil in 451 out of 500 simulated spills. In five of 500 simulated spills, 39 to 41 eiders were exposed for the 1,580 bbl spill, and 48 to 52 eiders were exposed for the 5,912 bbl spill. The average number of spectacled eiders exposed was 1.1 (maximum 41) for the 1,580 bbl spill in July, and 1.7 (maximum 52) for the 5,912 bbl spill in July.

Given that the estimated population size of spectacled eiders within the survey area during July was 540, the model predicts that, of those, the average (and maximum) proportions likely to be affected are 0.20 (7.6) percent, and 0.37 (9.6) percent for the 1,580 and 5,912 bbl spills, respectively.

As data suggests the North Slope breeding population of spectacled eiders has remained relatively stable since 2000 (Stehn et al. 2006), and the effects analysis is in the same geographic area, and uses a comparable volume of oil in the spill analysis, the Service concludes that the analysis is still relevant for the current Liberty project. The model predicts if a large spill were to occur in the summer, when listed eiders are present in the area, a maximum of 52 spectacled eiders may be killed. This equates to <1% of the estimated 12,916 North Slope population (Stehn et al. 2006). Therefore, we conclude a large spill event, such as the one modeled, is not likely to jeopardize spectacled eiders.

Annual eider aerial surveys suggest extremely low numbers of Steller's eiders nest on the eastern North Slope. During the 1999 and 2000 aerial surveys of the Liberty project area no Steller's eiders were observed (Stehn and Platte 2000), and there is no indication that a large proportion of the Alaska-breeding Steller's eider population would encounter a spill that originated from the Liberty project. Therefore, we conclude a spill from the Liberty project would not jeopardize listed Steller's eiders.

Indirect Effects
Indirect effects of the action are defined as "those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur" (50 CFR §402.02). After reviewing the project the Service concludes no indirect effects to listed eiders are reasonably certain to occur.

Interrelated and Interdependent Actions
Interdependent actions are defined as "actions having no independent utility apart for the proposed action," while interrelated actions are defined as "actions that are part of a larger action and depend upon the larger action for their justification" (50 CFR §402.02). The Service has not identified any interdependent or interrelated actions that may result from the proposed activities that could result in additional effects to listed eiders.

6. CUMULATIVE EFFECTS

Under the Act, cumulative effects are the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation under the Act.

Although further oil-related development or expansion of the material site may occur in the action area, the Service is not aware of planned developments. Furthermore, the action area and its surroundings are classified as wetlands or marine waters, so future development would presumably require a Section 404 permit. The issuance of this permit would serve as a federal nexus and section 7 consultation would be required. Hence, no cumulative effects are anticipated as a result of this project.

7. CONCLUSIONS

After reviewing the current status of spectacled and Alaska-breeding Steller's eiders, the environmental baseline, effects of the proposed activities, and cumulative effects, it is the Service's biological opinion that activities associated with the Liberty project are not likely to jeopardize the continued existence of either species, and are not likely to destroy or adversely modify designated critical habitat.

In evaluating the impacts of the proposed project to Steller's and spectacled eiders, the Service concludes that the direct adverse impacts could result through habitat loss, collisions, an increase in predators, and through crude and refined oil spills if they occur.

Using methods and logic explained in the Incidental Take Statement below, we estimate an incidental take of two spectacled eider eggs/chicks and one adult, and less than one Steller's eider egg/chick. The population of North Slope-breeding spectacled eiders is estimated at 12,916 birds, while our estimate of Steller's eider population size is roughly 500. Hence, the predicted incidental take should not have significant population-level

effects. The Service therefore believes that this level of take will not significantly affect the likelihood of survival and recovery of either species.

Although the Act does not require consultation for candidate species, by mutual agreement with the MMS, we have evaluated potential impacts to Kittlitz's murrelets in anticipation of possible future listing. Although limited information currently exists regarding the specific distribution of the species, Kittlitz's murrelets do not appear to regularly occur in action area, and hence we conclude the Liberty project is not likely to pose a significant threat for this species. We appreciate the willingness of MMS to proactively consider the conservation needs of Kittlitz's murrelets.

8. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, but not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

The measures described below are non-discretionary, and must be undertaken by MMS so that they become binding conditions of any permit or authorization issued to BP Alaska for the exemption in section 7(o)(2) to apply. MMS has a continuing duty to regulate activities covered by this incidental take statement. If the MMS (1) fails to assume and implement the terms and conditions, or (2) fails to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse.

As described in Section 5 - *Effects of the Action*, the activities described and assessed in this BO may adversely affect Steller's and spectacled eiders through habitat loss at the material site, collision with structures, an increase in predators in the area, and oil spills.

Habitat Loss

Work at the material site will result in the loss of 37 acres (0.15 km^2) of potential eider nesting habitat. Incidental take that may result from this loss was estimated by multiplying the area of habitat loss by the estimated density of listed eiders. Spectacled

eider density in the material site area is estimated to be <0.1 birds/km^2 (Figure 5.2). Steller's eider density across the North Slope aerial survey area during 2002-2006 averaged 0.0045 birds/km^2 (Larned et al. 2003, 2005a, 2005b, 2006), and in the absence of site specific data, this average was used.

The density estimates were multiplied by the average clutch size for each species [5.5 eggs for Steller's (Service data), and 3 eggs for spectacled eiders (Petersen et al. 2000)], and project life. As it is not clear if the material site rehabilitation plan will restore any acreage to habitat suitable for eider nesting, a 100-year project life was used. Using this methodology an incidental take of 2 spectacled eider eggs/chicks and <1 Steller's eider egg/chick was estimated.

Collisions

The Liberty project would involve the construction and operation of a large drill rig and associated facilities on the expanded Endicott SDI. The proposed expansion would present a 1,394-foot sheet pile wall and 660 feet of buildings and structures across the east-west migration axis, posing a collision risk for birds. Although the project will involve construction of additional facilities on Endicott MPI, they will be sited between and beside existing structures, and should not significantly increase collision risk.

The Service anticipates that threatened eiders may collide with Liberty structures. However, estimating the number of collisions is difficult due to a lack of information on migration routes, behavior, and vulnerability to collisions with obstructions.

Migration routes of the species are not fully understood and may have considerable inter- and intra-annual variation. However, we assume that only birds nesting east of Liberty project structures are at risk. Service data from the 1993 – 2006 aerial surveys for breeding eiders on the North Slope was combined to provide a longitudinal distribution of spectacled eider observations. We estimate 1.93% of the population nest east of the action area. Using this information and the long-term population mean of 12,916 for spectacled eiders (Stehn et al. 2006), we estimate 250 spectacled eiders may migrate past Liberty each year.

A strike rate is required to estimate collision risk, but no specific data on spectacled or Steller's eider collision rates are available. We therefore used recorded numbers of common eider (*Somateria mollissima*) collisions at Northstar Island as a surrogate. Northstar Island is located north of Prudhoe Bay in the Beaufort Sea Outer Continental Shelf (OCS), and has a 560-meter north/south profile (i.e., the cross section of the island on a north-south axis). In 2000-2004, respectively, 6, 8, 0, 4, and 3 common eiders were known to strike Northstar, for an average of 4.3/year (2000 data reported by BP Alaska to the Service; 2001-2004 data from Day et al. 2005).

A collision risk (percent of population killed per year) was then calculated as the annual average of Northstar Island common eider strikes divided by the number of birds which presumably migrate past the island (176,109, the most recent population estimate of

common eiders migrating over the Beaufort Sea (Quakenbush & Suydam 2004), according to the following formula:

	$\frac{\text{Annual average number of strikes}}{\text{Population estimate}}$	x 100	=	Percent of population killed each year by collisions (strike rate)
or:	$\frac{4.3}{176{,}109}$	x 100	=	0.0024 %

Assuming that spectacled and Steller's eider collision risk is similar to that of common eiders, the following mortality rate was estimated for spectacled eiders:

0.0024% (collision rate) of 500 birds (population of 250 birds passing through the area x 2 migrations, spring and molt) = 0.012 spectacled eiders/year.

The mortality rate was multiplied by 30, the life expectancy of the project, to give an estimated 0.36 (1) total spectacled eider killed by collisions with Liberty infrastructure.

Steller's eiders occur on the North Slope in extremely low densities, with very few recent observations in or east of the action area (Figure 3.6). Because so few Steller's eiders migrate through the action area, the Service considers it extremely unlikely that a Steller's eider will collide with any of the proposed structures, therefore no incidental take of Steller's eiders is anticipated as a result of collisions.

Oil Spills

There is always some risk of oil, fuel, or toxic spills associated with oil development. If a spill were to occur, particularly to marine waters, it is possible listed eiders could contact oil or oil products and die. However, as spills are not an otherwise legal activity, no incidental take is provided for oil or petroleum product spills.

9. REASONABLE AND PRUDENT MEASURES

These reasonable and prudent measures (RPMs) and their implementing terms and conditions aim to minimize the incidental take anticipated from BP Alaska's Liberty project. As described in Section 8 – *Incidental Take Statement*, project activities are anticipated to lead to incidental take of spectacled eiders through habitat loss and collisions.

To minimize the incidental take anticipated in this BO, MMS and their agents, BP Alaska, are required to undertake the following RPMs.

RPM A – Work with the Service to design, install, and operate strobe warning lights at Endicott SDI.

RPM B – Report all avian mortalities and collisions and their circumstances to the Service.

10. TERMS AND CONDITIONS

To be exempt from the prohibitions of Section 9 of the Act, MMS and their agent, BP Alaska, must comply with the following terms and conditions, which implement the RPM described above. These terms and conditions are non-discretionary.

RPM A – *Work with the Service to design, install, and operate strobe warning lights for the Endicott SDI.*

In cooperation with the Service, MMS and BP Alaska should develop and implement a system of strobe warning lights for the Endicott SDI.

Data from Northstar Island (Day et al. 2003) showed that the use of warning strobes significantly decreased eider flight speed at night. A net increase in the passing distance from eiders to Northstar was observed when the strobes were operating, and Day et al. (2005) concluded the lights caused some avoidance of the island.

Warning strobes should be placed outside the eastern sheet-pile wall in an effort to aid migrating eiders in avoiding the Endicott SDI. The lights should be synchronous, and not red in color. The Service recommends they be shaded in a manner that directs light outwards to the east, while minimizing their visibility to personnel on the island. The lights should operate from late June through the end of November when listed eiders may be moving east to west through the area. Their use can be temporarily suspended if required to ensure human safety (e.g., when aircraft are approaching).

RPM B – *Report all avian mortalities and collisions and their circumstances to the Service.*

Dead or injured birds observed in the project area, and any vehicle/avian collisions on the Endicott road system, should be reported to the Service. For purposes of this BO, the Endicott road system is defined as the road between the new material site, the Endicott SDI, and Endicott MPI. The date, time, location, and weather when the bird was observed should be included in the report. For vehicle collisions, a brief narrative describing the incident should be included. The Service does not recommend the collection of dead birds to avoid risk of avian influenza. However, a photograph should be taken to aid identification if possible. BP Alaska is responsible for transmitting this data to MMS within 7 days. As MMS is the federal agency with whom this consultation is being conducted, they are required to report all collisions to the Service and should do so as soon as practicable.

11. CONSERVATION RECCOMENDATIONS

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

MMS and BP Alaska are encouraged to:

- Continue to work with the Service to develop lighting designs and strategies that reduce collision risk for eiders at oilfield infrastructure.
- Continue to support research to improve our understanding of Steller's and spectacled eiders, the reasons for their decline, and assist in focusing and conducting recovery efforts.

In order for the Service to be kept informed of actions affecting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

12. REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the Biological Assessment and other materials for the Liberty Development Project. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1) The amount or extent of incidental take is exceeded;
2) New information reveals effects of the action agency that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;
3) The agency action is subsequently modified in a manner that causes an effect to listed or critical habitat not considered in this opinion; or
4) A new species is listed or critical habitat is designated that may be affected by the action.

Thank you for your cooperation in the development of this biological opinion. If you have any comments or require additional information, please contact Ted Swem, Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Fairbanks, Alaska, 99701.

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APPENDIX 1 – SUMMARY OF CONSULTATION ACTIVITIES

This summary of section 7 consultation activities refers only to the most recent project design (uERD with expansion of Endicott SDI). Details of consultation activities on previous Liberty project designs, and a full administrative record for the consultation, are available from the Fairbanks Fish and Wildlife Field Office.

12/11/06 - BP Alaska meets with Fairbanks Fish and Wildlife Field Office staff to provide an overview of the new design for the Liberty Development Project.

3/29/07 - FWS receives a species list request for the Liberty project from MMS.

4/3/07 - FWS sends the requested species list to MMS.

5/31/07 - FWS receives a Biological Assessment and supplemental information, and a memo requesting formal section 7 consultation be initiated.

6/20/07 - FWS responds that sufficient information has been received to allow consultation to begin.

7/2/07 - FWS receives the oil spill analysis for the Liberty project.

8/3/07 - Mr. John Goll (MMS Regional Director) telephone Mr. Thomas Melious (Service Regional Director) requesting that consultation be completed ahead of the statutory deadline.

8/8/07 - FWS requests clarification from BP Alaska on aspects of the project.

8/9/07 - BP Alaska responds to the request.

8/17/07 - FWS, MMS, BP Alaska and their consultants meet via teleconference to discuss the project and outstanding issues and possible terms and conditions.

8/20/07 - FWS distributes teleconference meeting notes, including a list of clarifications and descriptions required before the BO can be finalized.

8/28/07 - FWS distributes preliminary draft RPMs and terms and conditions for comment.

8/28/07 - MMS provides comments on draft RPMs and terms and conditions.

9/10/07 - BP Alaska submits additional information to support the BO.

9/18/07 - MMS and FWS discuss the additional information provided by BP Alaska.

9/18/07 - FWS requests clarification on some of the additional information provided in BP Alaska's September 10, 2007 letter.

9/19/07 - BP Alaska provides the necessary clarification.

10/1/07 - FWS e-mails the Draft BO to MMS.

10/2/07 - MMS provides minor comments on the Draft BO to the Service.

10/3/07 - FWS issues the Final BO.