United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701

December 2, 2011

Kevin Morgan,
Chief, Regulatory Division
USACE Alaska District
P.O. BOX 6898, CEPOA-RD
JBER, AK 99506-0898

Re: Biological Opinion for the ConocoPhillips Alaska, Inc.'s proposed CD-5 project (POA-2005-1576)

Dear Mr. Morgan:

This document transmits the U.S. Fish and Wildlife Service's (Service's) Biological Opinion (BO) on a revised proposal by ConocoPhillips Alaska, Inc. to construct and operate Alpine Satellite Development CD-5 and concludes section 7 consultation on the proposed action.

After reviewing the information provided, the status of the species, the environmental baseline, and cumulative effects, the Service has concluded that the proposed activities may adversely affect spectacled eiders (*Somateria fischeri*), polar bears (*Ursus maritimus*), and polar bear critical habitat but are not likely to jeopardize the continued existence of either species and are not likely to destroy or adversely modify designated critical habitat for polar bears. We also concluded that the proposed action is not likely to adversely affect Steller's eiders *(Polysticta stelleri*).

The Service previously issued a BO for CPAI's proposed Alpine Satellite Development Project located within the Colville River Delta and the eastern planning area of the National Petroleum Reserve-Alaska on September 28, 2004 (2004 BO). In the 2004 BO, the Service concluded that the proposed project, including plans for future development of CD-5, would not jeopardize the continued existence of spectacled eiders and the proposed action was not likely to adversely affect Steller's eiders.

Although we provide updated information and analysis regarding effects to spectacled eiders in the current BO, the conclusions, incidental take statement, and terms and conditions of the 2004 BO remain valid. We have incorporated the 2004 BO into the current BO as Appendix B.

If you have comments or concerns regarding this BO, please contact Sarah C. Conn, Field Supervisor, Fairbanks Fish and Wildlife Field Office at (907) 456-0499.

Sincerely,

Sarah C. Conn
Field Supervisor

BIOLOGICAL OPINION

for the

CD-5 ALPINE SATELLITE FACILITY
CONOCOPHILLIPS ALASKA, INC.

Consultation with the
U.S. Army Corps of Engineers
Anchorage, Alaska

Prepared by:
Fairbanks Fish and Wildlife Field Office
U. S. Fish and Wildlife Service
101 12th Ave, Room 110
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December 2, 2011

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1. INTRODUCTION

This document is the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) on a revised proposal by ConocoPhillips Alaska, Inc. (CPAI) to construct and operate Alpine Satellite Development CD-5. CPAI has submitted a revised permit application (POA-2005-1576) to the U.S. Army Corps of Engineers (USACE;) under Section 404 of the Clean Water Act and USACE reinitiated section 7 consultation on the proposed CD-5 project on October 21, 2011.

Consultation History

The Service issued a BO for CPAI's proposed Alpine Satellite Development Project (ASDP) located within the Colville River Delta and the eastern planning area of the National Petroleum Reserve-Alaska (NE NPR-A) on September 28, 2004 (2004 BO; USFWS 2004). The 2004 BO examined potential effects of the proposed project on spectacled eiders (*Somateria fischeri*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA) in consultation with the Bureau of Land Management (BLM) as the lead action agency and the USACE and the U.S. and the Coast Guard as cooperating agencies. The Service concluded that the proposed project would not jeopardize the continued existence or recovery of spectacled eiders and issued incidental take of 1 adult spectacled eider and 3 spectacled eider eggs/ducklings resulting from long-term habitat loss. The Service also concurred with the BLM's determination that the proposed action was not likely to adversely affect Steller's eiders *(Polysticta stelleri*).

On December 20, 2005, the Service issued a letter to USACE analyzing the validity of the 2004 BO with respect to changes to the development of CD-5. At that time, the Service did not anticipate that additional adverse effects on spectacled or Steller's eiders would result from the changes to CPAI's Alpine Satellite project and determined that the conclusions, incidental take statement, and terms and conditions of the 2004 BO remained valid.

Reinitiation

Section 7(a)(2) of the ESA, (16 U.S.C. § 1531 et seq.), requires that each Federal agency shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. When the action 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 USFWS, depending upon the protected species that may be affected. Section 7(b) of the ESA requires that the consultation be summarized in a BO detailing how the action may affect protected species.

This BO describes the effects of the revised CD-5 project on Steller's eiders, spectacled eiders, polar bears (*Ursus maritimus*), and polar bear critical habitat pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The Service has reanalyzed the validity of the 2004 BO with respect to Steller's eiders and spectacled eiders; and we have assessed the potential impacts to polar bears and their critical habitat because

these listed resources were not included in previous consultations, these listed resources. The Service listed polar bears as threatened throughout their range on May 15, 2008 (USFWS 2008a) and designated polar bear critical habitat on December 7, 2010 (USFWS 2010a).

We used information provided in CPAI's project description for the CD-5 Development Project, dated October 19, 2011; subsequent revisions to the project description detailed in CPAI's November 18, 2011 letter to the USACE; the 2004 BO; other Service documents; and published and unpublished literature to develop this BO.

Steller's Eiders

In Alaska, Steller's eiders breed almost exclusively on the Arctic Coastal Plain (ACP). Nesting on the ACP is concentrated in tundra wetlands near Barrow, AK. Steller's eiders occur at very low densities elsewhere on the ACP (Larned et al. 2010). USFWS Migratory Bird Management reported only 19 Steller's eiders observations within 50 miles of the proposed CD-5 site in the 1990s during annual aerial surveys of breeding waterfowl on the ACP (1992–2010; USFWS, unpublished data), with another 2 observations, ≥25 mi northwest of the site, reported from 2006. Because we consider the likelihood of encountering Steller's eiders in the action area to be extremely low, we conclude that adverse effects to Steller's eiders are discountable and that the proposed action is *not likely to adversely affect Steller's eiders*. Although the Environmental Baselines of Steller's eiders and spectacled eiders are described together later in the document, there will be no additional analysis of effects to Steller's eiders in this BO.

Spectacled Eiders, Polar Bears, and Polar Bear Critical Habitat

After reviewing the information provided, the status of the species, the environmental baseline, and cumulative effects, the Service concludes the proposed activities may adversely affect spectacled eiders, polar bears, and polar bear critical habitat but are not likely to jeopardize the continued existence of either species and are not likely to destroy or adversely modify designated critical habitat for polar bears. 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 the listed species;
2. Evaluate the relevance of the environmental baseline to the current status of spectacled eider and polar bear 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.

In addition to listed eiders and polar bears, the area affected by the ASAP project 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 the project 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. The USACE should not authorize any activity that may affect such species or critical habitat until it completes its obligations under applicable requirements of the ESA as amended (16 U.S.C. 1531 et seq.), including completion of any required procedure for conference or consultation.

If you have comments or concerns regarding this BO, please contact Sarah C. Conn, Field Supervisor, Fairbanks Fish and Wildlife Field Office at (907) 456-0499.

2. DESCRIPTION OF THE PROPOSED ACTION

Proposed Action

ConocoPhillips Alaska, Inc. has proposed to construct the CD-5 drill site; an access road, including a spur to a pipeline valve; pipelines; bridges and abutments; communication equipment; and power lines for oil and gas production. The following summary of the proposed action is based on information provided in in CPAI's project description for the CD-5 Development Project, dated October 19, 2011; subsequent revisions to the project description detailed in CPAI's November 18, 2011.

The proposed project would result in placement of 60.5 acres of fill material. The proposed CD-5 drill site (lat 70.3132, long –151.2245) will be located in the Colville River Unit, ~ 7 miles west/southwest of the existing Alpine Central Processing Facility (CD1), on a lease owned by CPAI and Anadarko Petroleum Company. The Kuukpik Corporation holds surface ownership of the project area with the exception of the bed of the Nigliq Channel, which is owned by the State of Alaska; the Arctic Slope Regional Corporation (ASRC) owns subsurface rights for the entire project area.

Oil, gas, and water produced from at the CD-5 facility will be transported via pipeline to CD1 for processing. The proposed drill site will be operated and maintained by Alpine staff and supported using existing CD1 infrastructure.

Development schedule

CPAI has proposed the following schedule for construction of the CD-5 facilities:

- 4th quarter 2013 – begin 2013–2014 ice road construction
- 1st quarter 2014 – construction of gravel satellite pad, gravel road, bridge piers and substructure; potential installation of VSM's
- 3rd quarter 2014 – turn gravel road and pad surface
- 4th quarter 2014 – begin 2014–2015 ice road construction
- 1st quarter 2015 – installation of VSMs, pipelines, and bridge superstructure

1st–4th quarter 2015 – construction of on-pad facilities

2nd quarter 2015 – begin drilling

4th quarter 2015 – first production

Although the development schedule may be modified as detailed design progresses, CPAI does not anticipate work to occur outside the indicated seasons or out of sequence.

Construction and Operations
The proposed project will consist of the following components

- Gravel pads
  - CD-5 drill site pad
  - Nigliagvik valve pad
  - Tie-in module pad
- Communication tower (on CD-5 pad)
- 6.1 mi of new pipelines (4) supported on common vertical support members (VSMs), with space for two future pipelines
- Power and communications lines supported by pipeline horizontal support members (HSMs)
- Gravel roads
  - 6.0 mi access road from CD-5 to the CD4 access road near CD4
  - 0.03 mi access road from the CD-5 access road to the Nigliagvik valve pad
- Channel crossings
  - 250-ft swale bridge north of Lake L9323
  - 1405-ft vehicle and pipeline bridge across Nigliq Channel
  - 317-ft vehicle bridge across Lake 9841 paleochannel
  - 277-ft bridge across Cody Creek
  - ≥41 culverts
- Ice roads and pads

Material site
Gravel required for construction of the drill site and access road will be obtained from a ASRC Mine Site located ~10.5 mi south east of the CD-5 drill site.

Camps
No permanent camp facilities are proposed at CD-5. Construction crews will be housed at permanent facilities at the Alpine base camp or in Nuiqsut, or at a temporary camp located at the CD-5 site or on an ice pad.

Drill site facilities
The proposed drill site will have a total gravel footprint of 11.74 acres, supporting development of up to 33 wells with 20-foot wellhead spacing. Minimum gravel depth will be

5.0 ft with increased depth where needed for thermal protection of permafrost (average gravel depth = 7.0 ft). The pad will be oriented northeast to southwest to minimize snow accumulation on the site. Drill site facilities, valve shelters, rig movement, drilling material storage, and well work equipment will be located on the gravel pad.

Pipelines
Four new pipelines will be supported on common VSMs:

- Miscible injectant pipeline (6-inch diameter)
- Seawater pipeline (8-inch diameter)
- Lean gas pipeline (6-inch diameter)
- Production pipeline (18-inch diameter)

Pipelines will transport miscible injectant and seawater from CD1 to the CD-5 site for injection; lean gas from CD1 to CD-5 for artificial lift; and produced fluids (crude oil, gas and water) from CD-5 to CD1 for processing. VSMs will be designed to potentially accommodate two additional pipelines, but these are not part of the current project.

Pipelines will be constructed a minimum of 7 feet above the tundra. Pipeline elevation will be maintained at each stream crossing, resulting in greater pipeline clearance over the stream and adjacent riparian habitat. Pipelines will be hydrotested prior to startup. The production pipeline will be placed at an inboard location on the Nigliq Channel bridge to provide additional protection from vehicle strikes. The pipeline route is shown on Sheets 7–11 of the project description.

Power and communications lines
The project will not include overhead transmission lines. The drilling rig will be powered initially by onsite diesel generators using low-sulfur diesel fuel until power lines are installed. Electrical power lines will be suspended from pipeline HSMs to connect CD-5 facilities to the existing Alpine power system.

Fiber optic communications systems will link CD-5 facilities with CD1. Communications lines will also be installed along pipelines.

CD-5 access road
The proposed 6.0-mile access road between CD-5 and the CD4 road has a total gravel footprint of 45.7 acres. The road will have a crown width of 32–34 ft, minimum base width of 50–54 ft, and minimum gravel thickness of 5 ft with 2:1 side slope. The access road route and proposed bridges and culvert batteries are shown on Sheets 7–11 of the project description.

Construction of the Nigliq Channel Bridge will require temporary placement of equipment and materials on the channel ice. Ice will be thickened across the entire width of the channel within approximately 200 feet upstream and downstream of the bridge site. Most construction equipment will operate from river ice in the Nigliq Channel during bridge

construction. Up to three temporary, pile-supported platforms (80 ft × 40 ft) may be constructed to support the weight of large cranes. Cuttings from installation of the bridge piers will be placed at the ASRC mine site.

Predator avoidance
CPAI will continue to work with the Service to address concerns regarding predator nesting potential on structures on this issue over the years. Measures will include minimizing available nesting locations through the use of deterrents, minimizing platforms available for building nests and other effective methods.

Ice roads and pads
Ice roads will be required to support gravel placement and pipeline construction. Ice pads (approximately 400 ft × 400 ft or 3.67 acres) may be placed near the CD-5 drill site, Alpine facilities, and adjacent to bridges to support construction and provide temporary storage space. An additional 3.67-acre, insulated ice pad may be constructed to store bridge construction materials through the summer of 2015. The insulated pad would be located north of the intersection of the proposed CD-5 access road and the existing CD4 road. No hazardous materials would be stored on the insulated ice pad.

Drilling operations
Drilling operations will begin the second quarter of 2015 and continue until all planned wells are completed. Crews will be housed at temporary camps on the CD-5 site during drilling. Production fluids will not be processed at the drill site beyond routine well testing and process fluid heating. Produced fluids will be transported via pipeline to the CD1 processing facility.

Waste disposal
Drilling wastes (muds and cuttings) will be stored temporarily onsite prior to annular disposal onsite or an transport to an approved Class II disposal well offsite, such as the Alpine disposal well at CD1. Drill cuttings may be washed and reused. Produced water will be processed and re-injected to the subsurface.

Sanitary wastes will be disposed of through annular disposal on-site, transported to the Alpine wastewater treatment system, or treated and discharged under the North Slope General NPDES Permit AKG-33-0000. Food waste will be incinerated at Alpine, will be recycled or trucked (non-burnables) to the NSB landfill at Deadhorse.

Spill prevention and response
CPAI will amend the existing spill prevention and response plans to include construction and operation of the new CD-5 drill site. The Alpine Development Oil Discharge Prevention and Contingency Plan (ODPCP) complies with State of Alaska (AS 46.03.020(10)(A) and 18 AAC 75) and U.S. Department of Transportation regulations (49 CFR 194). Presently, the Alpine ODPCP also acts as the Alpine Spill Prevention, Control, and Countermeasure (SPCC) Plan, implemented to prevent oil discharge to navigable waters of the United States.

However, an amended, stand-alone Alpine SPCC Plan will be developed in compliance with U.S. EPA regulations (40 CFR 112). These plans describe CPAI's capabilities in preventing oil and hazardous materials spills from entering aquatic and terrestrial habitats and ensuring rapid response if a spill does occur. Proposed spill prevention and response measures, including project design features, are described further in CPAI's project description for the CD-5 Development Project, dated October 19, 2011.

Action Area

The action area is the area in which direct and indirect effects of the action to listed species and designated critical habitat may occur. The area directly affected by the proposed project includes the total footprint of the CD-5 facilities, including gravel pads, access roads, pipelines, and associated permanent and construction support facilities. Most project activities will occur within polar bear critical habitat. The area indirectly affected by the proposed project is delineated by a zone of influence surrounding new infrastructure within which listed species may be affected by disturbance resulting from construction activities and project operations. This zone of influence is assumed to be 200 m (656 ft) for spectacled eiders and 1.6 km (1 mi) for polar bears. Potential effects to spectacled eiders and polar bears within these zones and polar are discussed further in Section 5, Effects of the action.

3. STATUS OF THE SPECIES AND CRITICAL HABITAT

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

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 (Fig 3.1).

Spectacled eiders molt in several 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), where they remain until March or April (Lovvorn et al. 2003).

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

Life history – North Slope population (breeding)
Research and spring aerial surveys have provided data on spectacled eider populations on Alaska's ACP (the North Slope breeding population) since 1992. On the North Slope, spectacled eiders breed north of a line connecting the mouth of the Utukok River to a point on the Shaviovik River about 24 km (~15 miles) inland from its mouth. Breeding density varies across the North Slope (Figure 3.3). Breeding pair numbers peak in mid-June and the number of males declines 4-5 days later (Smith et al. 1994, Anderson and Cooper 1994, Anderson et al. 1995, Bart and Earnst 2005).

North Slope spectacled eider clutch size averages 3.2-3.8, with clutches of up to eight eggs reported (Quakenbush et al. 1995). 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). 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, and then females with broods move from freshwater to marine habitats.

Nest success is highly variable and greatly influenced by predators, including gulls (*Larus* s pp.), jaegers (*Stercorarius* s pp.), and red (*Vulpes vulpes*) and arctic (*Alopex lagopus*) foxes. In arctic Russia, apparent nest success was calculated as <2% in 1994 and 27% in 1995; predation was believed to be the cause of high failure rates, with foxes, gulls and jaegers the suspected predators (Pearce et al. 1998). Apparent nest success in 1991 and 1993-1995 in the Kuparuk and Prudhoe Bay oil fields on the ACP varied from 25-40% (Warnock and Troy 1992, Anderson et al. 1998)

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.

Life history – Y-K Delta population (breeding)

Spectacled eiders historically nested throughout the coastal zone of the Y-K Delta. They currently breed primarily within about 15 km (~9 miles) of the coast from Kigigak Island north to Kokechik Bay (USFWS 1996; Figure 3.4), although a number of sightings have been made on the Y-K Delta both north and south of this area during the breeding season (R. Platte, USFWS, pers. comm. 1997). Breeding density varies in the primary nesting area, the central coast zone, of the Y-K Delta (Platte and Stehn 2009; Figure 3.4).

Spectacled eider clutch size at Kigigak Island on the Y-K Delta has averaged 4.9 eggs from 1992-2007, with clutches of up to eight eggs reported (Lake 2007). At Hock Slough on the Y-K Delta, clutch size averaged 5.2 from 1991-1995, with clutches up to seven eggs (Grand and Flint 1997). Nest initiation occurs from mid-May to mid-June (Lake 2007), incubation

lasts approximately 24 days (Dau 1974), and hatching occurs from mid-June to mid-July (Warnock and Troy 1992). On the nesting grounds, spectacled eiders feed on mollusks, insect larvae (craneflies, caddisflies, and 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, and then females with broods move directly from freshwater to marine habitats. Nest success is variable and greatly influenced by predators, including gulls (*Larus* s pp.), jaegers (*Stercorarius* s pp.), and red (*Vulpes vulpes*) and arctic (*Alopex lagopus*) foxes. On Kigigak Island in the Y-K Delta, nest survival probability ranged from 0.06 – 0.92 from 1992-2007 (Lake 2007). Nest success tended to be higher in years with low fox numbers or activity (i.e., no denning) and when foxes were eliminated from the island prior to the nesting season or years.

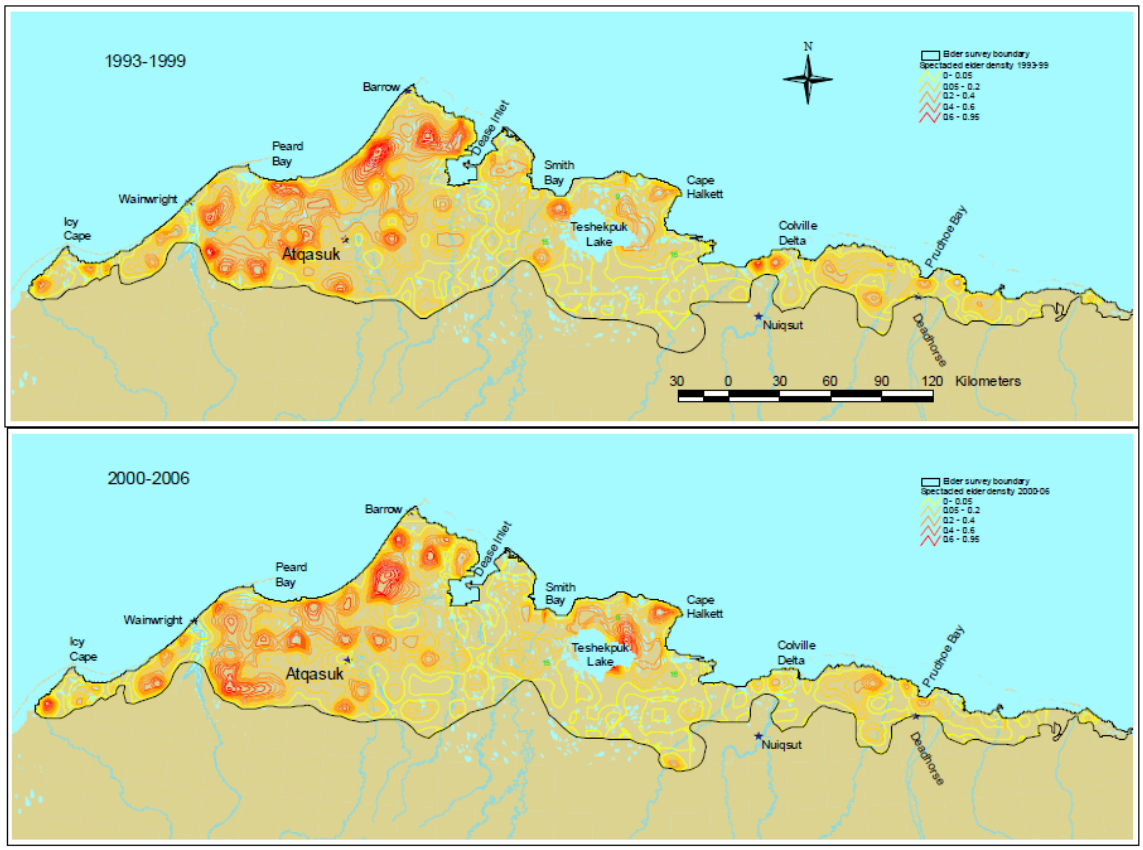

Figure 3.3. Mean spectacled eider breeding density across Alaska's Arctic Coastal Plain 1993-1999 above and 2000 – 2006 below (from Larned et al. 2006).

Life History – Demographics

Age at first breeding has not been determined but probably occurs most often in the third year for females and the third or fourth year for males, coinciding with the acquisition of plumage (USFWS 1999). Wild and captive spectacled eiders are documented to breed as early as 2 years of age. Spectacled eiders lay an average of five eggs (Strobel 2004), and their incubation period averages 24 days (Dau 1974). Egg hatchability on the North Slope and in arctic Russia is very high for nesting spectacled eiders. Spectacled eider eggs that are addled or that do not hatch are very rare in the Prudhoe Bay area (Declan Troy, TERA, pers. comm. 1997), and Esler et al. (1995) found very few addled eggs on the Indigirka River Delta in Arctic Russia. Additionally, from 1969 to 1973 at an inland site on the Yukon Delta National Wildlife Refuge, only 0.8% of spectacled eider eggs were addled or infertile (Dau 1974). In contrast, 24% of all nests monitored in a coastal region of the Y-K Delta during the early to mid-1990s contained inviable eggs (Grand and Flint 1997). Approximately 10% of eggs in successful nests did not hatch due to either embryonic mortality or infertility, and the relatively high occurrence of inviable eggs is believed to be related to exposure to contaminants (Grand and Flint 1997).

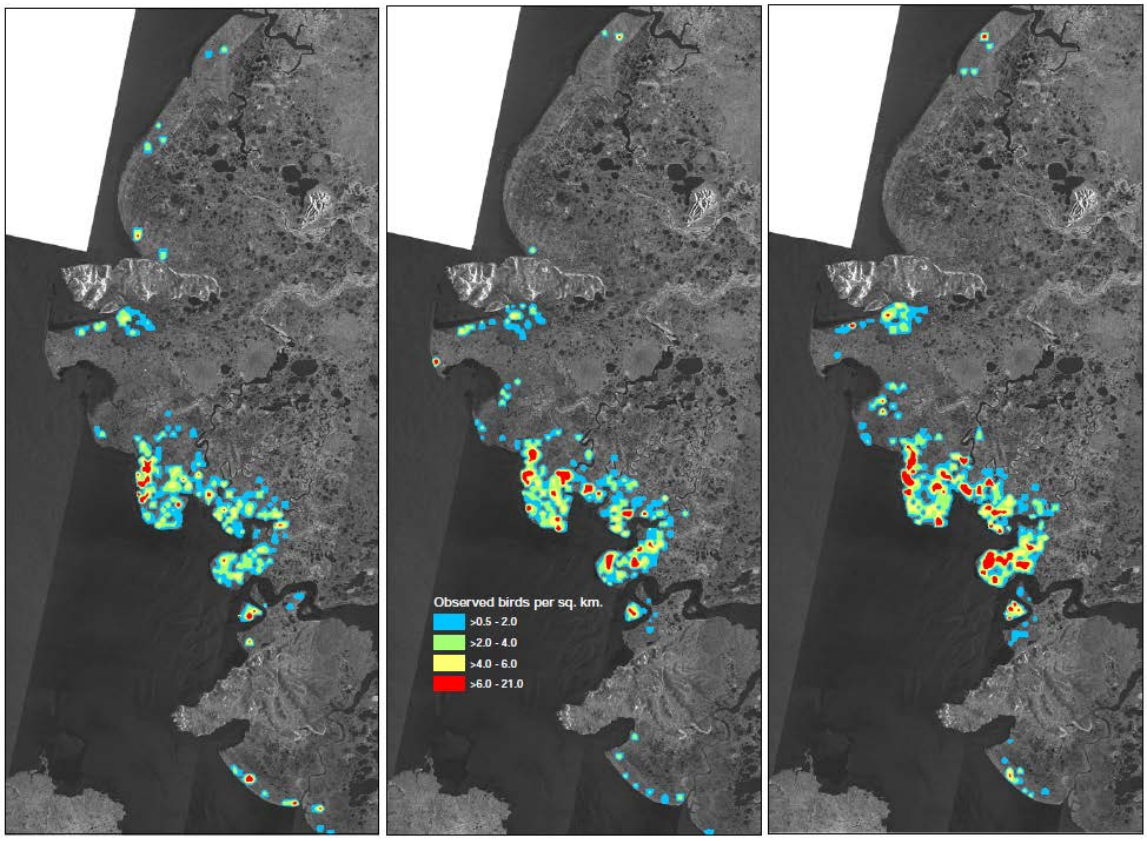

Figure 3.4 – Estimated relative density distribution of spectacled eiders on the central coast zone of the Yukon Delta, Alaska based on 3 time periods: 1998-2001 (left), 2002-2005 (middle), and 2006-2009 (right; from Platte and Stehn 2009).

Recruitment rate (the percentage of young eiders that hatch, fledge, and survive to sexual-maturity) of spectacled eiders is poorly known (USFWS 1999) as there is limited data on juvenile survival. The nesting success of spectacled eiders is variable, ranging from 20% to 95 % depending on the year and location (Bowman et al. 2002). Adult female survival can average 93%, and duckling survival can average 34 % (Flint and Grand 1997). In a coastal region of the Y-K Delta, duckling survival to 30 days averaged 34%, with 74% of this mortality occurring in the first 10 days. Survival of adult females during the first 30 days post hatch was 93+3% (Flint and Grand 1997).

Life history – (Non-breeding)
As with many other sea ducks, spectacled eiders spend the 8-10 month-long non-breeding season at sea, but until recently much about the species' life in the marine environment was unknown. Satellite telemetry and aerial surveys led to the discovery of spectacled eider migrating, molting, and wintering areas. These studies are summarized in Petersen et al. (1995), Larned et al. (1995), and Petersen at al. (1999).

Post-breeding
Males generally depart breeding areas on the North Slope (ACP) 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 near shore 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 in early summer when much of the Beaufort Sea is still frozen. Males departing from the Y-K Delta breeding grounds leave 3-weeks sooner than males from Russia and the North Slope (Petersen et al. 1999).

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). The greater use of the Beaufort Sea and offshore areas by females was attributed to the greater availability of open water when females depart the area (Peterson et al. 1999, TERA 2002).

Molt
Spectacled eiders use specific molting areas from July to late October. Larned et al. (1995) and Peterson et al. (1999) discussed spectacled eiders' apparently strong preference for specific molting locations, and concluded that all spectacled eiders molt in four discrete areas (Table 3.1). Females generally used molting areas nearest their breeding grounds. All transmittered females from the Y-K Delta molted in nearby Norton Sound (n = 18), while females from the North Slope (n = 15) molted in Ledyard Bay (10), along the Russian coast

(4), and near St. Lawrence Island (1). Males did not show strong molting site fidelity; males from all three breeding areas molted in Ledyard Bay, Mechigmenskiy Bay, and the Indigirka/Kolyma River Delta. Males reached molting areas first, beginning in late June, and remained through mid-October. Non-breeding females, and those that nested but failed, arrived at molting areas in late July, while successfully-breeding females and young of the year reached molting areas in late August or September and remained through October.

Avian molt is energetically demanding, especially for species such as spectacled eiders that complete molt in a few weeks. Molting birds must have ample food resources, and the rich benthic community of Ledyard Bay (Feder et al. 1989, 1994a, 1994b) likely provides these for spectacled eiders. Large concentrations of spectacled eiders molt in Ledyard Bay to use this food resource; aerial surveys on 4 days in different years counted 200 to 33,192 molting spectacled eiders in Ledyard Bay (Petersen et al. 1999; Larned et al. 1995).

Wintering

After molting, spectacled eiders migrate offshore in the Chukchi and Bering Seas to a single wintering area in openings in pack ice of the central Bering Sea south/southwest of St. Lawrence Island (Figure 3.2). In this relatively shallow area, hundreds of thousands of spectacled eiders (Petersen et al. 1999) rest and feed, diving up to 70 m to eat bivalves, mollusks, and crustaceans (Cottam 1939, Petersen et al. 1998, Petersen and Douglas 2004). Twelve spectacled eiders collected in the Bering Sea wintering area in March 2001 contained primarily the bivalve *Nuculana radiata* (Lovvorn et al. 2003). Sampling over several decades suggests that the benthic community in the overwintering area has shifted from larger to smaller species of clams (Lovvorn et al. 2000, Richman and Lovvorn 2003).

Table 3.1 Important staging and molting areas for each sex of each breeding population of spectacled eiders.

Population and Sex	Known Major Staging/Molting Areas
Arctic Russia Males	Northwest of Medvezhni (Bear) Island group
	Mechigmenskiy Bay
	Ledyard Bay
Arctic Russia Females	unknown
North Slope Males	Ledyard Bay
	Northwest of Medvezhni (Bear) Island group
	Mechigmenskiy Bay
North Slope Females	Ledyard Bay
	Mechigmenskiy Bay
	West of St. Lawrence Island
Y-K Delta Males	Mechigmenskiy Bay Northeastern Norton Sound
Y-K Delta Females	Northeastern Norton Sound

Late winter/spring

Recent information about spectacled and other eiders indicates that they probably make extensive use of the eastern Chukchi spring lead system between departure from the wintering area in March and April and arrival on the North Slope in mid-May or early June. Limited spring aerial observations in the eastern Chukchi have documented dozens to several hundred common eiders (*Somateria mollissima)* and spectacled eiders in spring leads and several miles offshore in relatively small openings in rotting sea ice (W. Larned, USFWS; J. Lovvorn, University of Wyoming, pers. comm.). Woodby and Divoky (1982) documented large numbers of king eiders (*Somateria spectabilis*) and common eiders using the eastern Chukchi lead system, advancing in pulses during days of favorable following winds, and concluded that an open lead is probably requisite for the spring eider passage in this region. Preliminary results from an ongoing satellite telemetry study conducted by the USGS Alaska Science Center (Figure 3.5; USGS, unpublished data) suggest that spectacled eiders also use the lead system during spring migration.

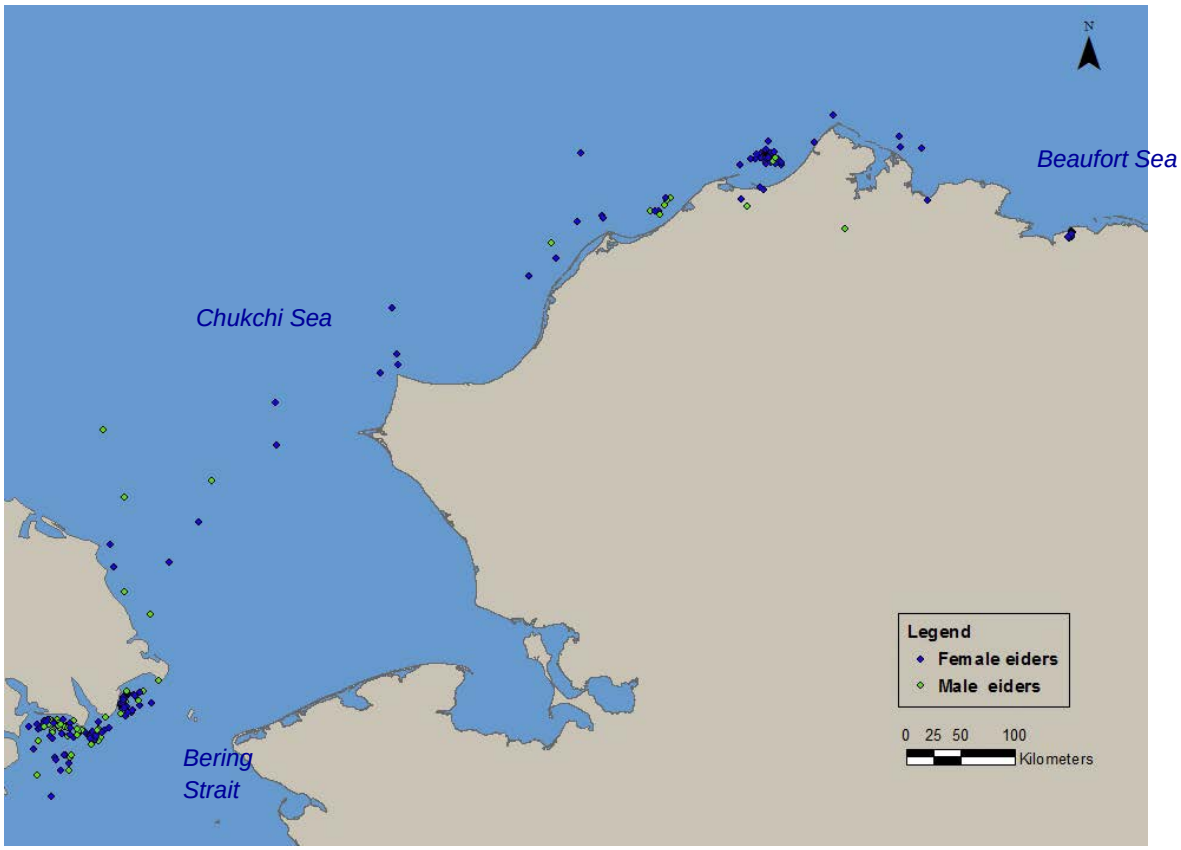

Figure 3.5. Spectacled eider satellite telemetry locations for 12 female and 7 male spectacled eiders in the eastern Chukchi Sea from 1 April – 15 June 2010 and 1 April – 15 June 2011. Additional locations from the northern coast of Russia are not shown. Eiders were tagged on the North Slope during the 2009 and 2010 breeding seasons. Data provided by Matt Sexson, USGS Alaska Science Center (USGS, unpublished).

Adequate foraging opportunities and nutrition during spring migration are critical to spectacled eider productivity. Like most sea ducks, female spectacled eiders do not feed substantially on the breeding grounds, but produce and incubate their eggs while living primarilyoff body reserves (Korschgen 1977, Drent and Daan 1980, Parker and Holm 1990). Clutch size, a measure of reproductive potential, was positively correlated with body condition and reserves obtained prior to arrival at breeding areas (Coulson 1984, Raveling 1979, Parker and Holm 1990). Body reserves must be maintained from winter or acquired during the 4-8 weeks (Lovvorn et al. 2003) of spring staging, and Petersen and Flint (2002) suggest common eider productivity on the western Beaufort Sea coast is influenced by conditions encountered in May to early June during their spring migration through the Chukchi Sea (including Ledyard Bay). Common eider female body mass increased 20% during the 4-6 weeks prior to egg laying (Gorman and Milne 1971, Milne 1976, Korschgen 1977, Parker and Holm 1990). For spectacled eiders, average female body weight in late March in the Bering Sea was 1,550 ± 35 g (n = 12), and slightly (but not significantly) more upon arrival at breeding sites (1,623 ± 46 g, n = 11; Lovvorn et al. 2003), indicating that spectacled eiders must maintain or enhance their physiological condition during spring staging.

Abundance and trends

The most recent rangewide estimate of the total number of spectacled eiders was 363,000 (333,526-392,532 95% CI), obtained by aerial surveys of the known wintering area in the Bering Sea in late winter 1996-1997 (Petersen et al. 1999). Winter/Spring aerial surveys were repeated in 2009 and 2010. Preliminary results from 2009 indicate an estimate of 301,812 spectacled eiders, but this value will be updated when surveys from both years are analyzed (Larned et al. 2009, p. 2).

In 1992, the Y-K Delta spectacled eider population was reportedly at about 4% of historic levels (Stehn et al. 1993). Evidence of the dramatic decline in spectacled eider nesting on the Y-K Delta was corroborated by Ely et al. (1994). They documented a 79% decline in eider nesting between 1969 and 1992 for areas near the Kashunuk River. Aerial and ground survey data indicated that spectacled eiders were undergoing a decline of 9-14% per year from 1985-1992 (Stehn et al. 1993). Further, from the early 1970s to the early 1990s, the number of pairs on the Y-K Delta declined from 48,000 to 2,000, apparently stabilizing at that low level (Stehn et al. 1993). Before 1972, an estimated 47,700 to 70,000 pairs of spectacled eiders nested on the Y-K Delta in average to good years (Dau and Kistchinski 1977).

Fischer et al. (2010) used ground-based and aerial surveys to estimate the number of nests and eggs of spectacled eiders on the coastal zone of the Y-K Delta from 1985–2010. The estimated total number of nests is a direct measure of effective breeding population size and an index to the number of potential nesters (Fischer et al. 2010). In 2010 they estimated 6,750 (SE 866) spectacled eiders nests on the Y-K Delta. The 2009 indicated total bird index, based solely on aerial surveys for the entire coastal zone, was 6,537 birds (SE 527; Platte and

Stehn 2009). The aerial index is lower than the nest estimate because the indicated total number of birds has not been corrected for detection probability. The average aerial index for 2005–2009 was 5,244 birds (4,872–5,616, 90% C.I.), and the estimated population averaged for the last 5 years was 11,411 spectacled eiders (9,657–13,165, 90% C.I.; corrected for detection probability of 46%).

The average population growth rate of the estimated number of nests on the Y-K Delta from 2000–2010 increased at 1.098 (1.057–1.138, 90%CI; Fischer et al. 2010). The population growth rate from 2000 to 2009 for the Y-K Delta indicated total bird index from aerial surveys of spectacled eiders was 1.081 (1.050–1.113, 90% CI; Platte and Stehn 2009). A more thorough analysis accounting for observer experience and survey timing yielded a 1993-2006 adjusted growth rate of 1.042 (1.030–1.053; 90% C.I.; Stehn et al. 2006).

No population estimates for the North Slope breeding population are available before 1993. At Prudhoe Bay, within the North Slope breeding area, Warnock and Troy (1992) documented an 80% decline in spectacled eider abundance from 1981 until 1991. For the North Slope breeding population, ground-plot surveys have not been conducted. The 2009 population index based on aerial surveys was 5,018 birds (SE 854; unadjusted for detection probability). The North Slope spectacled eider population from 1993-2009 was slightly decreasing, with an average (n = 17 years) population growth rate of 0.985 (0.971–0.999, 90% CI; Larned et al. 2010). The North Slope breeding population estimate for 2007–2009 (adjusted for detection probability = 46%) was 12,506 (9,365–15,646, 90% C.I.)

Spectacled eider recovery criteria

The Spectacled Eider Recovery Plan (USFWS 1996) presents research and management priorities with the objective of recovery and delisting so that protection under the Act is no longer required. Although the cause or causes of the spectacled eider population decline is not known, factors that affect adult survival are likely to 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 habitat loss, increased nest predation, over harvest, and disturbance and collisions caused by human infrastructure (factors discussed in Section 4 – *Environmental Baseline*). Under the Recovery Plan, the species will be considered recovered when each of the three recognized populations (Y-K Delta, North Slope of Alaska, and Arctic Russia): 1) is stable or increasing over 10 or more years and the minimum estimated population size is at least 6,000 breeding pairs, or 2) number at least 10,000 breeding pairs over 3 or more years, or 3) number at least 25,000 breeding pairs in one year. Spectacled eiders do not currently meet these recovery criteria.

Spectacled eider critical habitat

Critical habitat for molting spectacled eiders was designated in Norton Sound and Ledyard Bay molting areas, nesting areas on the Y-K Delta, and the wintering area southwest of St. Lawrence Island (critical habitat was not designated on the ACP; 66 CFR 9146 [February 6, 2001]) .

Polar Bear

The Service listed the polar bear (*Ursus maritimus*) as threatened throughout its range on May 15, 2008 (USFWS 2008a). Polar bears are widely distributed throughout the Arctic where the sea is ice-covered for large portions of the year. Sea ice provides a platform for hunting and feeding, for seeking mates and breeding, for denning, for resting, and for long-distance movement. Polar bears primarily hunt ringed seals, which also depend on sea ice for their survival, but they also consume other marine mammals (USFWS 2008a). Because the principal habitat of polar bears is sea ice, it is considered a marine mammal, and is therefore protected under the Marine Mammal Protection Act of 1972 (MMPA).

Distribution and status

Polar bears are distributed throughout regions of arctic and subarctic waters where the sea is ice covered for large portions of the year. The total number of polar bears worldwide is estimated to be 20,000–25,000 bears (Schliebe et al. 2006). Although movements of individual polar bears overlap extensively, telemetry studies have demonstrated spatial segregation among groups or stocks of polar bear in different regions of their circumpolar range (Schweinsburg and Lee 1982, Amstrup 2000, Garner et al. 1990 and 1994, Messier et al. 1992, Amstrup and Gardner 1994, Ferguson et al. 1999, Carmack and Chapman 2003). Patterns in spatial segregation suggested by telemetry data, along with information from surveys, marking studies, and traditional knowledge, resulted in recognition of 19 partially discrete polar bear groups by the International Union for the Conservation of Nature (IUCN) Polar Bear Specialist Group (PBSG). These 19 groups have been described as management subpopulations (or stocks) in the scientific literature and regulatory actions (IUCN 2006). The IUCN, Species Survival Commission Polar Bear Specialist Group ranked 11, four, and three of these stocks as “data deficient,” “reduced,” and “not reduced,” respectively (Obbard et al. 2010).

Two stocks of polar bears occur in Alaska: the Chukchi Sea (CS) and Southern Beaufort Sea (SBS) stocks. The ranges of these stocks are shown in Figure 3.6.

Movement patterns

Telemetry studies indicate polar bear movements are not random, nor do they passively follow ocean currents on the ice as previously thought (Mauritzen et al. 2003) Movement data come almost exclusively from adult female polar bears because male anatomy (their neck is larger than their skull) will not accommodate radio collars. The movements of seven male polar bears surgically implanted with transmitters in 1996 and 1997 were compared to movements of 104 females between 1985 and 1995 (Amstrup et al. 2001). The data indicated males and females had similar activity areas on a monthly basis, but males traveled farther each month (Amstrup et al. 2000). Activity areas have not been determined for many populations, and available information reflects movement data collected prior to recent changes wrought by retreating ice conditions. In the Beaufort Sea, annual activity areas for individually monitored female bears averaged 149,000 km^2 (range 13,000–597,000 km^2, Amstrup et al. 2000). Total annual movements by female bears in the Beaufort Sea averaged

3,415 km and ranged up to 6,200 km, with a movement rate of > 4 km/ hr sometimes sustained for long periods, and movements of > 50 km/day observed (Amstrup et al. 2000). Mean activity area in the Chukchi Sea, which is characterized by highly dynamic ice conditions, was 244,463 km^2 (Garner et al. 1990). Average annual distance moved by CS female bears was 5,542 km.

Radio-collared females indicate some individuals occupy home ranges (multi-annual activity areas), which they seldom leave (Amstrup 2003). The size of a polar bear's home range is determined, in part, by the annual pattern of freeze-up and break-up of sea ice, and therefore by the distance a bear must travel to access prey (Stirling 1988, Durner et al. 2004). A bear with consistent access to ice, leads, and seals may have a relatively small home range, while bears in areas such as the Barents, Greenland, Chukchi, Bering or Baffin seas may have to move many hundreds of kilometers each year to remain in contact with sea ice from which to hunt (Born et al. 1997, Mauritzen et al. 2001, Ferguson et al. 2001, Amstrup 2003, Wiig et al. 2003).

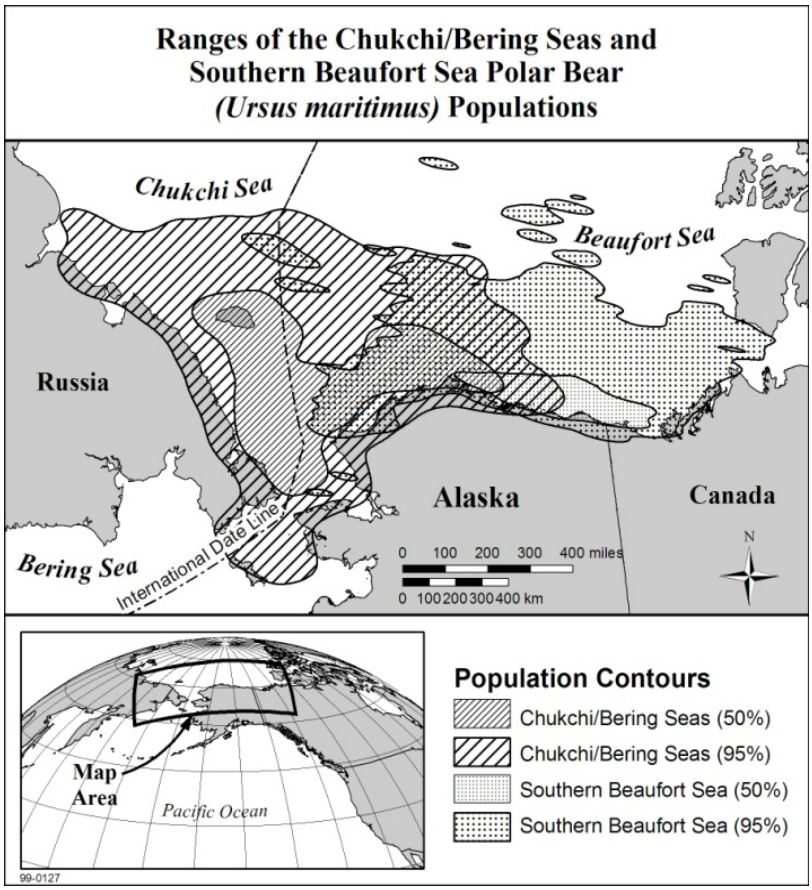

Figure 3.6 – Ranges of polar bear stocks in Alaska (USFWS 2009)

The CS population is widely distributed on the pack ice of the northern Bering, Chukchi, and eastern portions of the Eastern Siberian seas (Garner et al. 1990, Garner et al. 1994, Garner et al. 1995). Polar Bears are seasonably abundant in the Chukchi Sea and their distribution is influenced by the movement of seasonal pack ice. Polar bears in the Chukchi and Bering seas move south with advancing ice during fall and winter, and move north in advance of receding ice in late spring and early summer (Garner et al. 1990). Polar bears are dependent upon sea ice for foraging and the most productive areas are near ice edges, leads, or polynyas where ocean depth is minimal (Durner et al. 2004). Polar bears can be present along the Alaskan shoreline as they opportunistically scavenge on marine mammal carcasses.

The SBS population occurs between Icy Cape, Alaska on the western boundary and Pearce Point, NWT (Amstrup et al. 1986, Amstrup and DeMaster 1988, Stirling et al. 1988). It is thought that nearly all bears in the central coastal region of the Beaufort Sea are from the SBS population, and that proportional representation of SBS bears decreases to both the west and east. For example, only 50% of polar bears occurring in Barrow, Alaska and Tuktoyaktuk, NWT are SBS bears, with the remainder being from the CS and Northern Beaufort Sea populations.

Feeding

Polar bears derive essentially all their sustenance from marine mammal prey and have evolved a strategy that utilizes the high fat content of marine mammals (Best 1985, Amstrup et al. 2007). Over half the caloric content of a seal carcass occurs in the layer of fat between the skin and underlying muscle (Stirling and McEwan 1975) and polar bears quickly remove the fat layer from beneath the skin after they catch a seal. High fat intake from specializing on marine mammal prey allows polar bears to thrive in the harsh Arctic environment (Stirling and Derocher 1990, Amstrup 2003).

Over much of their range, polar bears are dependent on one species of seal, the ringed seal (*Phoca hispida*) (Smith and Stirling 1975, Smith 1980). The relationship between ringed seals and polar bears is so close that the abundance of ringed seals in some areas appears to regulate the density of polar bears, while polar bear predation in turn regulates density and reproductive success of ringed seals (Hammill and Smith 1991, Stirling and Øritsland 1995). Polar bears occasionally catch belugas (*Delphinapterus leucas*), narwhals (*Monodon monoceros*), walrus (*Odobenus rosmarus divirgens*), and harbor seals (*P. vitulina*) (Smith 1985, Calvert and Stirling 1990, Smith and Sjare 1990, Stirling and Øritsland 1995, Derocher et al. 2002). Where common, bearded seals (*Erignathus barbatus*) can be a large part of polar bear diets, and are probably the second most common prey item (Derocher et al. 2002), and walrus can be seasonally important in some parts of the polar bear's range (Parovshchikov 1965, Ovsyanikov 1996).

Polar bears rarely catch seals on land or in open water (Furnell and Oolooyuc 1980); rather they catch seals and other marine mammals at the air-ice-water interface, where aquatic mammals come to breathe (Amstrup et al. 2007). Although there are local exceptions (e.g. Bentzen et al. 2007), it appears that polar bears gain little overall benefit from alternate foods

(Amstrup et al. 2007). Therefore, maintenance of polar bear populations is dependent upon marine prey, largely ringed seals, and polar bears are tied to the surface of the ice for effective access to that prey (Amstrup et al. 2007).

Reproduction

Polar bears have an intrinsically low reproductive rate characterized by late age of sexual maturity, small litter sizes, and extended maternal investment in raising young. Female polar bears enter a prolonged estrus between March and June, when breeding occurs. Ovulation is thought to be induced by mating (Wimsatt 1963, Ramsay and Dunbrack 1986, Derocher and Stirling 1992). Implantation is delayed until autumn, and gestation is 195-265 days (Uspenski 1977), with active development of the fetus suspended for most of that time. The timing of implantation, and hence birth, is likely dependent upon body condition of the female, which in turn is dependent upon a variety of environmental factors (Schliebe et al. 2006). In the Beaufort Sea many pregnant females did not enter dens until late November or early December (Amstrup and Gardner 1994).

Throughout their range, most pregnant female polar bears excavate dens in snow located on land during September–November after drifts large enough to excavate a snow cave have formed (Harington 1968, Lentfer and Hensel 1980, Ramsay and Stirling 1990, Amstrup and Gardner 1994). In the southern Beaufort Sea a portion of the population dens in snow caves located on pack and shorefast ice. Successful denning by polar bears requires an accumulation of sufficient snow combined with winds to cause snow accumulation leeward of topographic features that create denning habitat (Harington 1968). The common characteristic of all denning habitat is topographic features that catch snow in the autumn and early winter (Durner et al. 2003).

Satellite telemetry studies determined mean dates of den entry in the Beaufort Sea were 11 and 22 November for land (n = 20) and pack ice (n = 16), respectively (Amstrup and Gardner 1994). Female bears foraged until den entry. Mean date of emergence was 26 March for pack-ice dens (n = 10) and 5 April for land dens (n = 18). Messier et al. (1994) reported mean date of den entry and exit varied among years depending upon sea ice, snow and weather conditions. For bears denning on sea ice or moving from sea ice to land denning habitat, time of sea ice consolidation can alter the onset of denning. Sea-ice dens must be in ice stable enough to stay intact for up to 164 days while possibly moving hundreds of kilometers by currents (Amstrup 2003, Wiig 1998).

Polar bear denning habitat in Alaska includes areas of low relief topography characterized by tundra with riverine banks within approximately 50 km of the coast (Amstrup 1993, Amstrup and Gardner 1994, Durner et al. 2001, 2003), and offshore pack ice pressure ridge habitat. Although the northern Alaskan coast gets minimal snow fall, because the landscape is flat the snow is blown continuously throughout the winter creating drifts in areas of relief.

Insufficient data exist to accurately quantify polar bear denning locations along the Alaskan Chukchi Sea coast; however, dens in the area are less concentrated than for other areas in the

Arctic. The majority of denning of Chukchi Sea polar bears occurs on Wrangel Island, Herald Island, and other locations on the northern Chukotka coast of Russia.

Data suggests that an increasing number of SBS females are denning on land. Sixty percent of radio-collared females denned on land from 1996–2006, compared to forty percent in the previous 15 years (Fishbach et al. 2007). The geographic distribution of terrestrial dens also appears to have shifted to the west (USFWS 2006).

Fidelity to denning habitat was investigated by Amstrup and Gardner (1994), who located 27 females at up to four successive maternity dens. Bears that denned once on pack ice were more likely to den on pack ice than on land in subsequent years. Similarly, bears were faithful to general geographic areas – those that denned once in the eastern half of the Alaska coast were more likely to den there than to the west in subsequent years. Annual variations in weather, ice conditions, prey availability, and the long-distance movements of polar bears (Amstrup et al. 1986, Garner et al. 1990) make recurrence of exact denning locations unlikely.

Polar bears give birth in the dens during mid-winter (Harington 1968, Ramsay and Dunbrack 1986). Survival and growth of the cubs depends on the warmth and stable environment within the maternal den (Blix and Lentfer 1979). Family groups emerge from dens in March and April when cubs are about three months old and able to survive outside weather conditions (Blix and Lentfer 1979, Amstrup 1995).

Newborn polar bears are very small, weighing approximately 0.6 kg (Blix and Lentfer 1979), and nurse from their hibernating mothers. Cubs grow quickly and may weigh 10-12 kg by the time they emerge from the den about three months later. Young bears stay with their mothers until weaned, which occurs most commonly in early spring when the cubs are 2.3 years of age. Female polar bears are available to breed again after cubs are weaned. Therefore, in most areas, the minimum successful reproductive interval for polar bears is 3 years (Schliebe et al. 2006).

Age of maturation of mammals is often associated with a threshold body mass (Sadleir 1969), and in polar bear populations it appears to be largely dependent on numbers and productivity of ringed seals. In the Beaufort Sea, ringed seal densities are lower in some areas of the Canadian High Arctic and Hudson Bay. As a possible consequence, female polar bears in the Beaufort Sea usually do not breed for the first time until they are 5 years of age (Lentfer and Hensel 1980), giving birth for the first time at 6 years of age.

Litter size and reproduction rates vary by geographic area and may change in response to hunting pressure, environmental factors, and other population perturbations. Litters of two cubs are common (Schliebe et al. 2006), with litters of three cubs occurring sporadically across the Arctic and most commonly reported in the Hudson Bay region (Stirling et al. 1977, Ramsay and Stirling 1988, Derocher and Stirling 1992). Average litter size across the species' range varied from 1.4 to 1.8 cubs (Schliebe et al. 2006), and several studies have

linked reproduction to availability of seal prey, especially in the northern portion of their range. Body weights of mother polar bears and their cubs decreased markedly in the mid-1970s in the Beaufort Sea following a decline in ringed and bearded seal pup production (Stirling et al. 1976, 1977, Kingsley 1979, DeMaster et al. 1980, Stirling et al. 1982, Amstrup et al. 1986). Declines in reproductive parameters varied by region and year with ice conditions and the corresponding reduction in numbers and productivity of seals (Amstrup et al. 1986). In the Beaufort Sea, female polar bears produce a litter of cubs at an annual rate of 0.25 litters per adult female (Amstrup 1995).

Polar bear reproduction lends itself to early termination without extensive energetic investment by the female (Ramsay and Dunbrack 1986, Derocher and Stirling 1992). Female polar bears may defer reproduction in favor of survival when foraging conditions are difficult (Derocher et al. 1992). Repeated deferral of reproduction could cause a decline in populations with an intrinsically low rate of growth (Schliebe et al. 2006).

Life span and survivorship

Polar bears are long-lived animals; the oldest known female polar bear in the wild was 32 years and the oldest known male was 28, although few bears in the wild live beyond 20 years (Stirling 1990). Taylor and colleagues (unpublished data) described survival rates that generally increased by age class up to approximately 20 years of age (cubs-of-the-year, 35–75%; subadults 1–4 years, 63–98%; adults 5–20 years, 95–99%; and adults > 20 years 72–99%).

Survival of cubs is dependent upon their weight when they exit maternity dens (Derocher and Stirling 1992), and most cub mortality occurred early in the period after emergence from the den (Amstrup and Durner 1995, Derocher and Stirling 1996), with early mortality generally associated with starvation (Derocher and Stirling 1996). Survival of cubs to the weaning stage (generally 27–28 months) is estimated to range from 15% to 56% of births (Schliebe et al. 2006). Subadult survival rates are poorly understood because telemetry collars cannot be used on rapidly growing individuals. Population age structure indicates subadults 2–5 years survive at lower rates than adults (Amstrup 1995), probably because their hunting and survival skills are not fully developed (Stirling and Latour 1978).

Eberhardt (1985) hypothesized adult survival rates must be in the upper 90% range to sustain polar bear populations. Studies using telemetry monitoring of individual animals (Amstrup and Durner 1995) estimated adult female survival in prime age groups may exceed 96%, and survival estimates are a reflection of the characteristics and qualities of an ecosystem to maintain the health of individual bears (Schliebe et al. 2006).

Abundance and Trends – Alaska Stocks

A reliable population estimate for the Chukchi Sea stock currently does not exist (USFWS 2010b). Reliable estimates of population size based upon mark and recapture studies are not available for this region, and measuring the population size is a research challenge. The combined Alaska–Chukotka polar bear harvest is currently believed to exceed sustainable

levels, and the status of the CS polar bear population is considered uncertain or declining (Schliebe et al. 2006).

The size of the SBS population was estimated at 1,526 (95% CI =1211−1841; Regehr et al. 2006), based on open population capture-recapture data collected in 2001–2006. This figure represents the most current and valid estimate of the SBS population (USFWS 2010c). Declining survival, recruitment, and body size (Regehr et al. 2006, 2007), low growth rates during years of reduced summer and fall sea ice (2004 and 2005), and an overall declining growth rate of 3% per year from 2001–2005 (Hunter et al. 2007), indicate the SBS stock population is declining (USFWS 2010c).

Declines in sea ice have occurred in optimal polar bear habitat in the southern Beaufort and Chukchi seas between 1985 to 1995 and 1996 to 2006, and the greatest declines in 21st century optimal polar bear habitat are predicted to occur in these areas (Durner et al. 2009). These stocks are vulnerable to large-scale dramatic seasonal fluctuations in ice movements which result in decreased abundance and access to prey, and increased energetic costs of hunting. The CBS and the SBS are currently experiencing the initial effects of changes in sea ice conditions (Rode et al. 2010, Regehr et al. 2010, and Hunter et al. 2007). Regehr et al. (2010) found that the vital rates of polar bear survival, breeding rates, and cub survival declined with an increasing number of ice-free days/year over the continental shelf, and suggested that declining sea ice affects these vital rates via increased nutritional stress.

Polar bear critical habitat

The Service designated polar bear critical habitat on December 7, 2010 (USFWS 2010a). The Primary Constituent Elements (PCEs) of critical habitat for the polar bear are:

1) Sea ice habitat used for feeding, breeding, denning, and movement, which is further defined as sea ice over waters 300 m (984.2 ft) or less in depth that occurs over the continental shelf with adequate prey resources (primarily ringed and bearded seals) to support polar bears.
2) Terrestrial denning habitat, which includes topographic features, such as coastal bluffs and river banks, with suitable macrohabitat characteristics. Suitable macrohabitat characteristics are:
    a) Steep, stable slopes (range 15.5–50.0°), with heights ranging from 1.3 to 34 m (4.3 to 111.6 ft), and with water or relatively level ground below the slope and relatively flat terrain above the slope;
    b) Unobstructed, undisturbed access between den sites and the coast;
    c) Sea ice in proximity to terrestrial denning habitat prior to the onset of denning during the fall to provide access to terrestrial den sites; and
    d) The absence of disturbance from humans and human activities that might attract other polar bears.

3) Barrier island habitat used for denning, refuge from human disturbance, and movements along the coast to access maternal den and optimal feeding habitat, including all barrier islands along the Alaska coast and their associated spits, within the range of the polar bear in the United States, and the water, ice, and terrestrial habitat within 1.6 km (1 mi) of these islands (no-disturbance zone).

The Service designated three polar bear critical habitat units, which correspond to each of the three PCEs described above. The Sea Ice Unit covers approximately 179,508 mi^2 of primarily marine habitat extending from the mean high tide line of the Alaska coast seaward to the 300 m depth contour, and spans west to the international date line, north to the Exclusive Economic Zone, east to the US–Canada border, and south to the known distribution of the Chukchi/Bering Seas polar bear population. Sea ice is used by polar bears for the majority of their life cycle for activities such as hunting seals, breeding, denning, and traveling (USFWS 2010a).

The Terrestrial Denning Unit covers approximately 5,657 mi^2 of land along the northern coast of Alaska from near Point Barrow east to the Canadian border. It encompasses approximately 95% of the known historical terrestrial den sites from the Southern Beaufort Sea (SBS) population (Durner et al. 2009). The inland extent of denning distinctly varies between two longitudinal zones, with 95% of the dens between the Kavik River and the Canadian border occurring within 20 miles of the mainland coast, and 95% of the dens between the Kavik River and Barrow occurring within 5 miles of the mainland coast.

The Barrier Island Unit covers approximately 4,083 mi^2 of barrier islands and the associated complex of spits, water, ice, and terrestrial habitats within one mile of barrier islands. There is significant overlap between this unit and both the terrestrial denning and sea ice units. The Barrier Island Unit follows a similar coastal extent as the Sea Ice Unit, from near Hooper's Bay in southwestern Alaska to near the Canadian Border.

Critical habitat does not include manmade structures (e.g., houses, gravel roads, generator plants, sewage treatment plants, hotels, docks, seawalls, pipelines) and the land on which they are located existing within the boundaries of designated critical habitat on the effective date of this rule.

Sea ice, including ice designated as critical habitat, is rapidly diminishing. Terrestrial denning locations in Alaska do not appear to be a limiting factor. However, rain-on-snow events may decrease den quality, and later onset of freeze-up in the fall may limit sea ice in proximity and therefore access to terrestrial denning habitat (USFWS 2007). Erosion of barrier islands and the Arctic shoreline, presumably caused by climate change (Mars and Houseknecht 2007), may be changing terrestrial denning habitat by creating or destroying bluffs.

Human activities such as ground-based vehicular traffic and low-flying aircraft occur in polar bear critical habitat. These activities may temporarily create disturbance between den sites

and the coast (e.g., disturbance from ice roads), and may temporarily degrade the ability of barrier island habitat from being a refuge from human disturbance. For example, vessels may need to use barrier islands to weather out a storm, and this may interfere with a polar bear's ability to use barrier islands for the same purpose. However, these activities are usually infrequent and have short-term effects.

4. ENVIRONMENTAL BASELINE

Regulations implementing the ESA (50 CFR §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in an action area, the anticipated impacts of all proposed Federal projects in an action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process. This section provides an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species or critical habitat within the action area.

Spectacled eiders

The following discussion of the environmental baseline of spectacled eiders includes a summary of their status within the action area and a discussion of factors that may have contributed to their current status. Both spectacled and Steller's eiders breed on the ACP, although Steller's eiders are rare in the Action Area. Because both eider species have undergone significant, unexplained declines in their Alaska-breeding populations, the factors that have potentially contributed to the current status of both species are discussed below and include, but are not limited to, toxic contamination of habitat, increase in predation, over harvest, and habitat loss through development and disturbance.

Status of spectacled eiders within the Action Area

The area between Teshekpuk Lake and the Colville River Delta is breeding habitat for > 10% of spectacled eiders on the North Slope (Service, unpublished). Annual aerial surveys conducted by the Service indicate that up to 5.4 % of North Slope breeding spectacled eiders make use of areas in or adjacent to the Alpine Satellite Development. In summer, spectacled eiders are widely distributed near lakes or coastal margins throughout this area with a trend toward higher abundance towards the coast and within the Colville River Delta (Figure 4.1). Spectacled eiders are essentially absent from the Area from late October through late May.

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 YKD (Franson et al. 1995, Grand et al. 1998) and Steller's eiders on the ACP (Trust et al. 1997; Service unpublished data). Female Steller's eiders nesting at Barrow in 1999 had blood lead concentrations that reflected exposure to lead (>0.2 ppm lead), and six of the seven tested had blood lead concentrations that indicated poisoning (>0.6 ppm lead) (Pattee and Pain 2003). Additional lead isotope tests confirmed the lead in the Steller's eider blood

was of lead shot origin, rather than natural sources such as sediments (Matz, USFWS, unpublished data). A juvenile Steller's eider, found shot dead at Barrow in 2008, also had a single ingested lead pellet in its gizzard, indicating spent lead shot is still available to migratory birds that feed in that environment (Matz, USFWS, pers. comm.). However, the USFWS Office of Law Enforcement is encouraged by much recent progress in the decreasing use of lead shot, especially on the North Slope (use of lead shot for hunting waterfowl is prohibited statewide, and for hunting all birds on the North Slope). Hunter outreach programs are ongoing to reduce any continuing use of lead shot in waterfowl nesting areas, and the Service reports good compliance in most areas with the lead shot prohibitions.

Water birds in arctic regions are also exposed to global contamination, including radiation, 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).

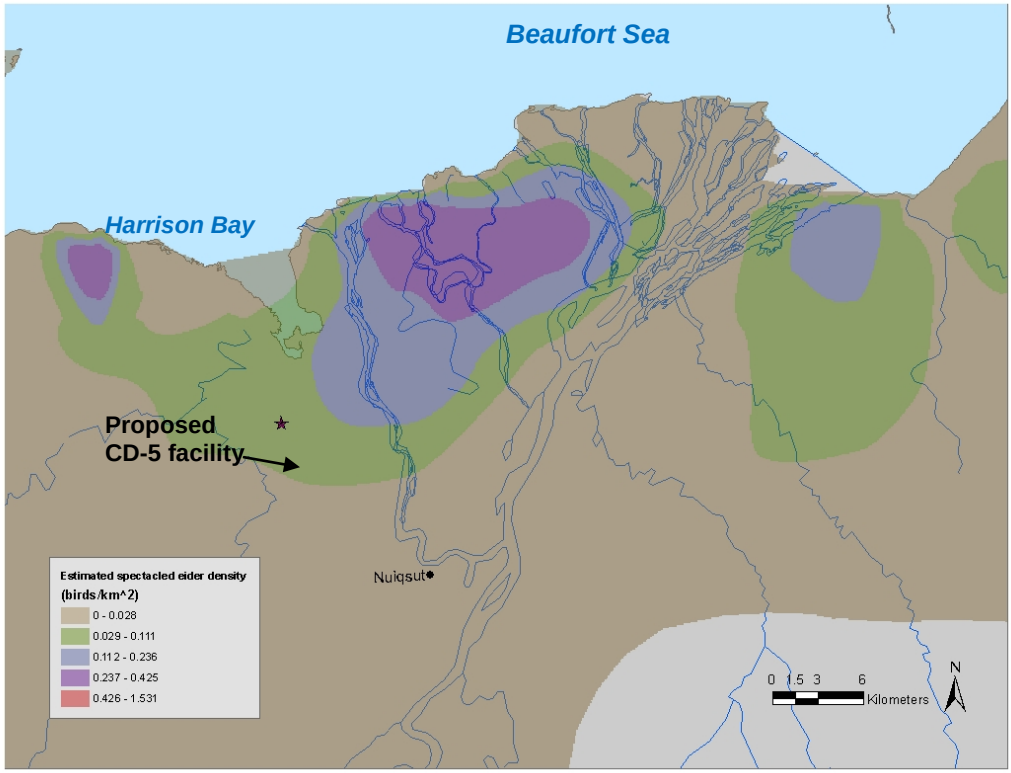

Figure 4.1. Estimated spectacled eider density in the Alpine Satellite Development area. Denisty polygons are based on the 2007–2010 Arctic Coastal Plain aerial survey data (USFWS Migratory Bird Management, unpublished data).

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, 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.

Eider breeding ecology studies at Barrow indicate fox control may have a positive effect on Steller's eider nest survival rates (the probability a nest will hatch at least one egg). Nest survival averaged 0.16 before fox control was implemented near Barrow (1991–2004) and 0.52 in 2005–2007 during fox control (Rojek 2008). Average nest survival in 2008 was 0.58 (n = 27; Safine 2011; no eiders nested in 2009 and only 2 nests were found in 2010).

Over harvest
Hunting for spectacled and Steller's eiders was closed in 1991 by Alaska State regulations and Service policy. Outreach efforts have been conducted by the North Slope Borough, BLM, and Service to encourage compliance. However, harvest data collected from the spring/summer subsistence hunts suggests that both Steller's and spectacled eiders are being taken during this hunt on the North Slope (Service data). Measures are being implemented to avoid and minimize the lethal take of listed eiders on the North Slope during spring/summer subsistence hunts.

Habitat loss through development and disturbance
With the exception of contamination by lead shot, destruction or modification of North Slope nesting habitat of listed eiders has been limited to date, and is not thought to have played a major role in population declines of spectacled or Steller's eiders. Until recently eider breeding habitat on the ACP was largely unaltered by humans, but limited portions of each species' breeding habitat have been impacted by fill of wetlands, the presence of infrastructure that presents collision risk, and other types of human activity that may disturb birds or increase populations of nest predators. These impacts have resulted from the gradual expansion of villages, coupled with cold war era military developments such as the Distant Early Warning (DEW) Line sites at Cape Lonely and Cape Simpson (*circa* 1957), and, more recently, the initiation and expansion of oil development since construction of the Prudhoe Bay field and Trans Alaska Pipeline System (TAPS) in the 1970s.

The population of communities such as Barrow has been increasing, and BLM (2007) expects growth to continue at approximately 2% per annum until at least the middle of this century. Assuming community infrastructure and footprint grow at roughly the same pace as population, BLM (2007) estimates that community footprint could cover 3,600 acres by the 2040s. Oil and gas development has steadily moved westward across the ACP towards NPR-

A since the initial discovery and development of oil on the North Slope. Given industries interest in NPR-A, as expressed in lease sales, seismic surveys, and drilling of exploratory wells, the westward expansion of industrial development is likely to continue. Scientific, field-based research is also increasing on the ACP as interest in climate change and impacts to high latitude areas continues.

Scientific, field-based research is also increasing on the ACP as interest in climate change and its effects on high latitude areas continues. While many of these activities have no impacts on listed eiders as they occur in seasons when eiders are absent from the area, or use remote sensing tools, on-the-ground activities and tundra aircraft landings likely disturb a small number of listed eiders each year. Many of these activities are considered in intra-Service consultations, or under a programmatic consultation with BLM for summer activities in NPR-A.

Incidental take

Recent activities on the eastern ACP that required formal section 7 consultation, and the estimated incidental take of listed eiders, is presented in Table 4.1. These actions were considered in the final jeopardy analysis of this BO. It should be noted that incidental take is estimated prior to the implementation of reasonable and prudent measures and associated terms and conditions which serve to reduce the levels of incidental take. Further, in some cases included in this table, estimated take is likely to occur over the life of the project (often 30–50 years) rather than annually or during single years reducing the severity of the impact to the population. There are also important differences in the type of incidental take. The majority of the incidental take estimated is a loss of eggs/ducklings, which is of much lower significance for survival and recovery of the species than the death of an adult bird. For example, spectacled eider nest success recorded on the YKD ranged from 18-73% (Grand and Flint 1997), and average clutch size was 5 eggs (Petersen et al. 1999). From the nests that survived to hatch, spectacled eider duckling survival to 30-days ranged from 25-47% on the YKD (Flint et al. 2000). Over-winter survival of one-year old spectacled eiders was estimated at 25% (P. Flint pers. comm.), with annual adult survival of 2-year old birds (that may enter the breeding population) of 80% (Grand et al. 1998). Using these data (in a very simplistic scenario) we estimate for every 100 spectacled eider nests on the YKD, less than 2 - 17 adult females would be expected to survive and enter (recruit) into the breeding population. Similarly, we expect that only a small proportion of spectacled and Steller's eider eggs or ducklings on the North Slope would eventually survive to recruit into the breeding population.

Table 4.1 illustrates the number and diversity of actions that required consultation in Alaska. We believe these estimates have overestimated, possibly significantly, actual take. Actual take is likely reduced by the implementation of terms and conditions in each biological opinion, is spread over the life-span of a project (often 50 years), and is dominated by the *potential* loss of eggs/ducklings which, as described above, is of less significance than adult mortality for survival and recovery of these K-selected species. Also, it remains unknown to what degree the spectacled and Steller's eiders potentially affected by disturbance can

reproduce in disturbed areas or move to other less disturbed areas to reproduce. If either or both occur, these factors also serve to reduce actual impacts from the maximal potential impacts.

Table 4.1 - Activities on the eastern Arctic Coastal Plain that required formal section 7 consultation and the amount of incidental take provided. Listed activities include those where effects to listed eiders may occur within NE NPR-A and east to the Sagavanirktok River, including the Colville River Delta.

Project Name	Impact Type	Estimated Incidental Take
Beaufort Sea Planning Area Lease Sale 186, 195, & 202 (2002)	Collisions	5 adult spectacled eiders 1 adult Steller's eider
Intra-Service, Issuance of Section 10 permits for spectacled eider (2000)	Disturbance Collection	10 spectacled eiders 10 spectacled eider eggs 25 spectacled eiders
Alpine Development Project (2004)	Habitat loss Collisions	4 spectacled eider eggs/ducklings 3 adult spectacled eiders
ABR Avian Research/USFWS Intra-Service Consultation (2005)	Disturbance	5 spectacled eider eggs/ducklings
Pioneer's Oooguruk Project (2006)	Habitat loss Collisions	3 spectacled eider eggs/ducklings 3 adult spectacled eiders
Intra-Service Consultation on MBM Avian Influenza Sampling in NPR-A (2006)	Disturbance	7 spectacled eider eggs/ducklings
KMG Nikaitchuq Project (2006)	Habitat loss Collisions	2 spectacled eiders/year 7 adult spectacled eiders
BP 69kV powerline between Z-Pad and GC 2 (2006)	Collisions	10 adult spectacled eiders
BP Liberty Project (2007)	Habitat loss Collisions	2 spectacled eider eggs/ducklings 1 adult spectacled eider
Intra-service on Subsistence Hunting Regulations (2007)	No estimate of incidental take provided	
BLM Programmatic on Summer Activities in NPR-A (2007)	Disturbance	21 spectacled eider eggs/ducklings
Intra-Service Consultation on MBM Avian Influenza Sampling in NPR-A (2007)	Disturbance	6 spectacled eider eggs/ducklings
Intra-service on Subsistence Hunting Regulations (2008)	No estimate of incidental take provided	
BLM Programmatic on Summer Activities in NPR-A (2008)	Disturbance	56 spectacled eider eggs/ducklings
BLM Northern Planning Areas of NPR-A (2008)	Disturbance Collision	87 spectacled eider eggs/ducklings/year 12 Steller's eider eggs/ducklings/year < 7 adult spectacled eiders < 1 adult Steller's eider
MBM/USFWS Intra-Service, Shorebird studies and white-fronted goose banding in NPR-A (2008)	Disturbance	21 spectacled eider eggs/ducklings
BP Alaska's Northstar Project (2009)	Collisions	≤ 2 adult spectacled eiders/year ≤ 1 adult Steller's eider/year

Intra-Service, Section 10 permit for USGS telemetry research on spectacled eider use of the Bering, Chukchi, and Beaufort Seas (2009; North Slope field sites)	Loss of Production Capture/surgery	130 spectacled eider eggs/ducklings 4 adult spectacled eiders
Intra-service on Subsistence Hunting Regulations (2009)	No estimate of incidental take provided	
BLM Programmatic on Summer Activities in NPR-A (2009)	Disturbance	49 spectacled eider eggs/ducklings
Minerals Management Service Beaufort and Chukchi Sea Program Area Lease Sales (2009)	Collision	12 adult spectacled eiders <1 adult Steller's eider
Intra-Service, Migratory Bird Subsistence Hunting Regulations (2010)	No estimate of incidental take provided	
Intra-Service, Section 10 permit for USGS telemetry research on spectacled eider use of the Bering, Chukchi, and Beaufort Seas (2010; North Slope field sites)	Loss of Production Capture/handling/ surgery	130 spectacled eider eggs/ducklings 7 adult/juvenile spectacled eiders (lethal take) 108 adult/juvenile spectacled eiders (non-lethal take)
BLM Programmatic on Summer Activities in NPR-A (2010)	Disturbance	32 Spectacled eider eggs
Intra-Service, USFWS Migratory Bird Management goose banding on the North Slope of Alaska (2010)	Disturbance	4 spectacled eider eggs/ducklings
Intra-Service, Section 10 permit for ABR Inc.'s eider survey work on the North Slope and at Cook Inlet (2010)	Disturbance	35 spectacled eider eggs/ducklings
Intra-Service, Migratory Bird Subsistence Hunting Regulations (2011)	Shooting	400 adult Steller's eiders (lethal take) 4 adult spectacled eiders (lethal take)
Intra-Service, Section 10 permit for ABR Inc.'s eider survey work on the North Slope and at Cook Inlet (2011)	Disturbance	20 spectacled eider eggs/ducklings
Intra-Service, Section 10 permit for USGS telemetry research on spectacled eider use of the Bering, Chukchi, and Beaufort Seas (2011; Colville River Delta field site)	Capture/handling/ surgery	65 juvenile + 13 adult spectacled eiders (non-lethal take) 7 adult/juvenile spectacled eiders (lethal take)

Climate change

High latitude regions, such as Alaska's North Slope, are thought to be especially sensitive to the effects of climate change (Quinlan et al. 2005, Schindler and Smol 2006, and Smol et al. 2005). While climate change will likely affect individual organisms and communities it is difficult to predict with any specificity how these effects will manifest. Biological, climatological, and hydrologic components of the ecosystem are interlinked and operate on multiple spatial, temporal, and organizational scales with feedback between the components (Hinzman et al. 2005).

There are a wide variety of changes occurring in the arctic worldwide, including Alaska's North Slope. Arctic landscapes are dominated by lakes and ponds (Quinlan et al. 2005), such as those used by listed eiders for feeding and brood rearing. In many areas these water bodies are drying out during the summer as a result of thawing permafrost (Oechel et al. 1995, Smith et al. 2005), and increased evaporation and evapotranspiration as they are ice-free for longer periods (Schindler and Smol 2006, and Smol and Douglas 2007). Productivity of lakes and ponds appears to be increasing as a result of nutrient inputs from thawing soil and an increase in degree days (Quinlan et al. 2005, Smol et al. 2005, Hinzman et al. 2005, and Chapin et al. 1995). Changes in water chemistry and temperature are resulting in changes in the algal and invertebrate communities, which form the basis of the food web in these areas (Smol et al. 2005, Quinlan et al. 2005).

With the reduction in summer sea ice, the frequency and magnitude of coastal storm surges has increased. These often result in breaching of lakes and low lying coastal wetland areas killing salt intolerant plants and altering soil and water chemistry, and hence, the fauna and flora of the area (USGS 2006). Historically sea ice has served to protect shorelines from erosion; however, this protection has decreased as sea ice has declined. Coupled with softer, partially thawed permafrost, the lack of sea ice has significantly increased coastal erosion rates (USGS 2006), potentially reducing available coastal tundra habitat.

Changes in precipitation patterns, air and soil temperature, and water chemistry are also affecting tundra vegetation communities (Hinzman et al. 2005, Prowse et al. 2006, Chapin et al. 1995), and boreal species are expanding their range into tundra areas (Callaghan et al. 2004). Changes in the distribution of predators, parasites, and disease causing agents resulting from climate change may have significant effects on listed species and other arctic fauna and flora. Climate change may also result in mismatched timing of migration and the development of food in Arctic ponds (Callaghan et al. 2004), and changes in the population cycles of small mammals such as lemmings to which many other species, including nesting Steller's eiders (Quakenbush and Suydam 1999), are linked (Callaghan et al. 2004).

While the impacts of climate change on listed species in both the action area and marine environment that comprises the rest of their range are unclear, species with small populations are vulnerable to environmental change (Crick 2004). Some species will increase in abundance and range with climate change, while others will suffer from reduced population size and range. The ultimate effects of climate change on listed eiders are undetermined at present.

Polar bear

Status of polar bears in the action area

Polar bears spend the majority of their time on ice in waters over the productive continental shelf. Polar bears are generally widely and sparsely distributed across the Beaufort Sea. The SBS is distributed across the northern coasts of Alaska, Yukon, and Northwest territories of Canada. Estimates of the population size of the SBS were 1,778 from 1972 to 1983 (Amstrup et al. 1986), 1,480 in 1992 (Amstrup 1995), and 2,272 in 2001 (Amstrup, USGS

unpublished data). Most recently, Regehr et al. (2006) estimated the SBS to be 1,526 (95% CI = 1,211; 1,841). Declining survival, recruitment, and body size (Regehr et al. 2006, Regehr et al. 2009, Rode et al. 2010), and low population growth rates during years of reduced sea ice (2004 and 2005), and an overall declining population growth rate of 3% per year from 2001 to 2005 (Hunter et al. 2007) suggest that the SBS is now declining. The status of this stock is listed as 'reduced' by the IUCN (Obbard et al. 2010) and 'depleted' under the MMPA.

Unlike polar bears in eastern Canada, the Alaskan stocks do not currently spend extended periods of time on land (Garner et al. 1990). Non-denning bears travel through the Action Area, including the Colville River Delta. Only pregnant female polar bears den; other members of the population (males, solitary females, and females with older cubs) remain active throughout winter. Land-denning polar bears may be encountered in the action area. Durner et al. (2006) found approximately 50% of pregnant females in the Beaufort Sea came ashore to construct maternity dens, while Amstrup and Gardner (1994) found 42% of females observed in the Alaskan Chukchi and Beaufort seas and Canadian Beaufort Sea from 1983–1991 denned on land. The most recent data (Fishbach et al. 2007) suggests 60% of females in these areas den on land, while the remaining females denned on shore-fast ice, or drifting pack ice.

Females polar bears generally come ashore to den in late October/early November depending upon ice movements and timing of freeze up (Lentfer and Hensel 1980); however, Amstrup and Gardner (1994) reported that many pregnant females in the Beaufort Sea did not enter dens until late November or early December. In Alaska, dens are sparsely distributed along a narrow coastal strip with sightings reported up to 48 km inland (Lentfer and Hensel 1980) and 61 km inland (Amstrup and Gardner 1994). Denning habitat includes areas such as coastal and river banks and bluffs where snow accumulates early. A review of historical polar bear den locations in Alaska (Durner et al. 2010) reported 4 dens on land within 25 km (15.5 mi) of the CD-5 facility (Figure 4.2; data do not represent densities of dens). The closest den was located 10.9 km (6.8 mi) west of the proposed CD-5 facility in 2007; two additional dens were located northeast of the project area on the Colville River Delta in 1997 and 2002; and the fourth was located near the Colville River, 5.7 km (3.5 mi) southeast of Nuiqsut in 1917.

Although the loss of sea ice habitat resulting from climate change is considered the principle threat to polar bears, other threats occurring in the Action Area, include hunting, development, environmental contaminants, disease, and predation could impact the species.

Hunting

Prior to the 1950s, most hunting was by indigenous people for subsistence purposes. Increased sport hunting in the 1950s and 1960s resulted in population declines (Prestrud and Stirling 1994). International concern about the status of polar bears resulted in biologists from the five polar bear range nations forming the Polar Bear Specialist Group (PBSG) within the IUCN SSC (Servheen et al. 1999). The PBSG was largely responsible for the

development and ratification of the 1973 International Agreement on the Conservation of Polar Bears (1973 Polar Bear Agreement), which called for international management of polar bear populations based on sound conservation practices. It prohibits polar bear hunting except by local people using traditional methods, calls for protection of females and denning bears, and bans use of aircraft and large motorized vessels to hunt polar bears. The PBSG meets every 3-5 years to review all aspects of polar bears science and management, including harvest management.

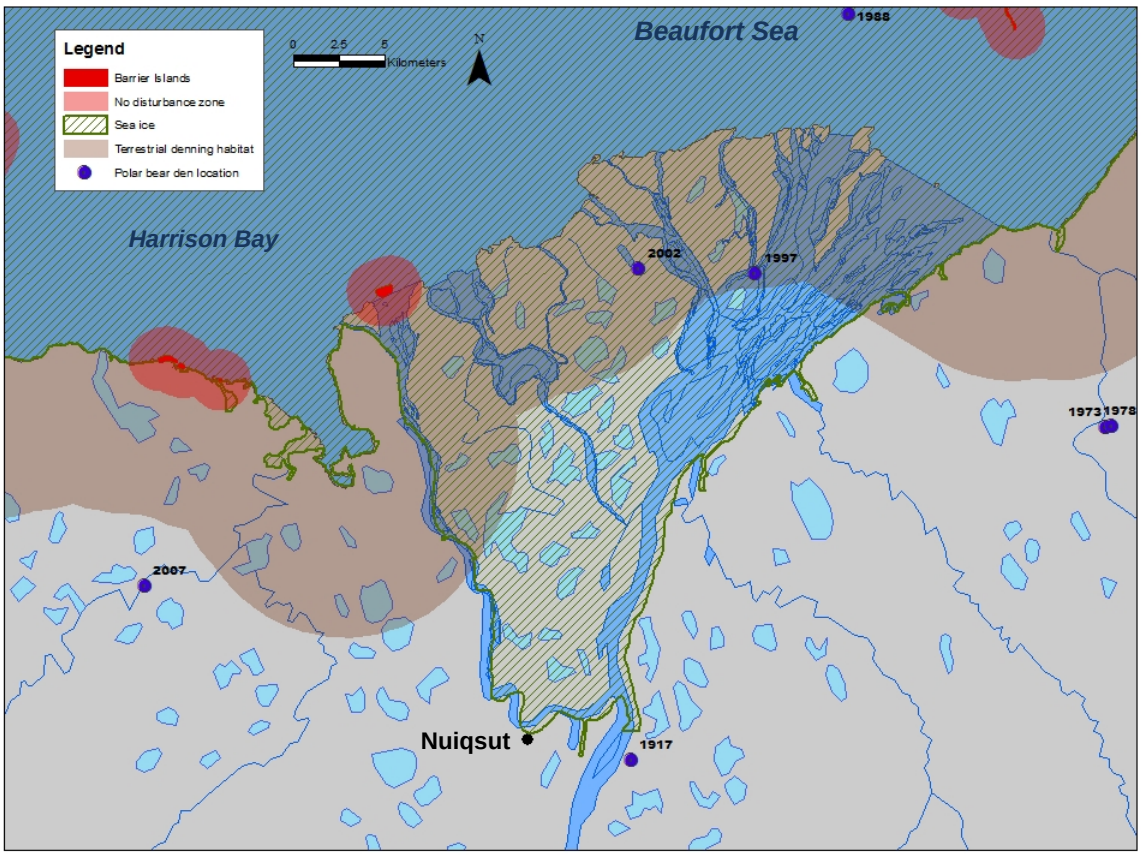

Figure 4.2. Historical polar bear den observations on and near the Colville River Delta. (Den locations from Durner et al. 2010)

Additionally, since passage of the MMPA in 1972 (MMPA), the sport hunting of polar bears in the United States has ceased. However, the MMPA provides a special exemption to Coastal dwelling Alaska Natives who may continue to take polar bears for subsistence or handicraft purposes. Currently, under the MMPA, there are no restrictions on the number, season, or age of polar bears that can be harvested by Alaska Natives.

However, there is a more restrictive Native-to-Native agreement between Inupiat from Alaska and Inuvialuit in Canada that was developed in 1988. Regulation of this harvest, which is considered sustainable, is based upon a voluntary harvest agreement between the Inuvialuit of Canada and the Inupiat of Alaska, who share subsistence hunting traditions within the range of the SBS. The Inuvialuit-Inupiat Polar Bear Management Agreement established quotas and recommendations concerning protection of denning females, family groups, and methods of take. Commissioners for the Inuvialuit-Inupiat Agreement set the original quota at 76 bears in 1988, and it was later increased to 80. At the Inuvialuit-Inupiat Polar Bear Management Meeting in July 2010, the quota was again reduced from 80 to 70 bears per year. The Native subsistence harvest from the SBS has averaged 36 bears removed per year (USFWS 2011). During the period 2005–2009, six polar bears were harvested by residents of Nuiqsut (USFWS 2011), which is located near the Action Area.

Oil and gas development

Documented impacts on polar bears by the oil and gas industry in Alaska during the past 30 years are minimal. Polar bears have been encountered at or near most coastal and offshore production facilities, or along roads and causeways that link these facilities to the mainland. However, interactions have been minimized by implementation of Incidental Take Regulations (ITRs) for the Beaufort Sea (USFWS 2006, 2011) and Chukchi Sea (USFWS 2008b) and the associated Letters of Authorization (LOAs) issued under the MMPA. The ITRs only authorize non-lethal incidental take. No lethal take associated with the oil and gas industry has occurred during the period covered by ITRs (1991 until present) in either the Chukchi or Beaufort seas, although prior to issuance of these regulations, lethal takes of adults by industry were rare (two known occurrences in Alaska since 1968).

Females and young cubs denning on land can be vulnerable to disturbance from oil and gas activities. Amstrup (1993) concluded most females were relatively tolerant of human disturbance, although there was considerable variation in levels of response by individual bears. Females appear more likely to abandon their dens in the fall before cubs are born and relocate if disturbed (Lentfer and Hensel 1980, Amstrup 1993, Durner et al. 2006), than in the spring when young cubs are less likely to survive if they leave the maternal den early (Amstrup 1993).

Formal section 7 consultations have been conducted for the Chukchi Sea and Beaufort Sea ITRs, which authorize the incidental, unintentional taking of a small number of polar bears in these seas and the adjacent western and northern coasts of Alaska during oil and gas activities in arctic Alaska. The BO for northern NPR-A evaluated potential impacts to polar bears from oil and gas development in that area, and the Liberty and Northstar BOs have been reevaluated to include an analysis of impacts of the projects to polar bears. These consultations and their conclusions were considered in the jeopardy analysis of this BO.

Environmental contaminants

Three main types of contaminants in the Arctic are thought to present the greatest potential threat to polar bears and other marine mammals: petroleum hydrocarbons, persistent organic pollutants (POPs), and heavy metals.

Potential exposure of polar bears to petroleum hydrocarbons comes from direct contact and ingestion of crude oil and refined products from acute and chronic oil spills. Polar bear range overlaps with many active and planned oil and gas operations within 40 km (25 mi) of the coast or offshore (Schliebe et al. 2006). To date, no major oil spills have occurred in the Alaska marine environment within the range of polar bears.

Polar bears could come in contact with oil spilled in the marine or land environment, or by ingesting contaminated prey (Neff 1990). Polar bears groom themselves regularly as a means to maintain the insulating properties of their fur, so oil ingestion would also be likely during grooming behavior by a fouled bear (Neff 1990). Polar bears are curious and are likely to investigate oil spills and oil contaminated wildlife. Although it is not known whether healthy polar bears in their natural environment would avoid oil spills and contaminated seals, bears that are hungry are likely to scavenge contaminated seals, as they have shown no aversion to eating and ingesting oil (St. Aubin 1990, Derocher and Stirling 1991).

Due to the seasonal distribution of polar bears, the times of greatest impact from an oil spill are summer and autumn (Amstrup et al. 2000a). This is important because distributions of polar bears are not uniform through time. In fact, near-shore densities of polar bears are two to five times greater in autumn than in summer (Durner et al. 2000), and polar bear use of coastal areas during the fall open water period has increased in recent years in the Beaufort Sea. A large number of bears might be affected by a large oil spill in this area, particularly during the broken ice period. 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 where polar bears congregate at bowhead whale carcasses. Industrial development in polar bear habitat may also expose individuals to other hazardous substances through improper storage or spills. For example, one polar bear died in Alaska from consuming ethylene glycol in 1988 (Amstrup et al. 1989).

Contamination of the Arctic and sub-Arctic regions through long-range transport of pollutants has been recognized for over 30 years (Bowes and Jonkel 1975, Proshutinsky and Johnson 2001, Lie et al. 2003). The Arctic ecosystem is particularly sensitive to environmental contamination due to the slower rate of breakdown of POPs, including organochlorine compounds (OCs), relatively simple food chains, and the presence of long-lived organisms with low rates of reproduction and high lipid levels. The persistence and lipophilic nature of organochlorines increase the potential for bioaccumulation and biomagnification at higher trophic levels (Fisk et al. 2001). The highest concentrations of OCs have been found in species at the top of the marine food chains such as glaucous gulls, which scavenge on marine mammals, and polar bears, which feed primarily on seals (Braune et al. 2005). Consistent patterns between OC and mercury contamination and trophic status

have been documented in Arctic marine food webs (Braune et al. 2005). The southern Beaufort Sea polar bear populations may have concentrations of mercury close to the toxicological threshold levels of 60 micrograms wet weight reported for marine mammals (AMAP 2004) above which an animal may exhibit adverse effects.

Disease

Except for the presence of *Trichinella* larvae, the occurrence of diseases and parasites in polar bears is relatively rare compared to other bears. Polar bears feed primarily on fat which is relatively free of parasites, except for *Trichinella* (Rogers and Rogers 1976, Forbes 2000). It is unknown whether polar bears are more susceptible to new pathogens due to their lack of previous exposure to diseases and parasites. Many different pathogens and viruses have been found in seal species that are polar bear prey (Duignan et al. 1997, Measures and Olson 1999, Dubey et al. 2003, Hughes-Hanks et al. 2005), so the potential exists for transmission of these diseases to polar bears. As polar bears become more stressed from food shortages, they may eat more of the intestines and internal organs than they do presently, thus increasing their potential exposure to parasites and viruses (Derocher et al. 2004).

Predation

The only predators of polar bears are humans (see *Hunting*, above) and other polar bears. Intraspecific killing has been reported among all North American bear species. Reasons for intraspecific predation in bears species is poorly understood but thought to include population regulation, nutrition, and enhanced breeding opportunities in the case of predation of cubs. Although infanticide by male polar bears has been well-documented (Hansson and Thomassen 1983, Larsen 1985, Taylor et al. 1985, Derocher and Wiig 1999), it is thought that this activity does not account for a large percentage of the cub mortality. A potential reason for infanticide relates to density-dependent mechanisms of population control as this behavior seems to occur more frequently with increasing population size (Derocher and Wiig 1999).

Cannibalism has been recently documented in polar bears (Derocher and Wiig 1999, Amstrup et al. 2006). Amstrup et al. (2006) observed three non-related instances of intraspecific predation and cannibalism in the southern Beaufort Sea during the spring of 2004. One incident was the first documented predation of an adult female in a den, the second was of a female and newly emerged cub from a den, and the third involved a yearling male. In a combined 58 years of research by the senior investigators similar observations had not taken place. Active stalking or hunting preceded the attacks and the killed bears were partially consumed. Adult males were believed to be the predator in the attacks. Amstrup et al. (2006) indicated that in general a greater portion of polar bears in the area where the predation occurred were in poor physical condition compared to other years. The authors hypothesized that adult males may be the first to show the effects of nutritional stress caused by significant ice retreat in this area (Skinner et al. 1998, Comiso and Parkinson 2004, Stroeve et al. 2005) because they feed less during the spring mating season and enter the summer in poorer condition than other sex/age classes. Derocher and Wiig (1999) documented a similar intraspecific killing and consumption of another polar bear in Svalbard,

Norway, which was attributed to relatively high population densities and food shortages. Taylor et al. (1985) documented that a malnourished female killed and consumed her own cubs, and Lunn and Stenhouse (1985) found an emaciated male consuming an adult female polar bear. The potential importance of cannibalism and infanticide for population regulation is unknown. Given our current knowledge of disease and predation, we do not believe that these factors currently are having population-level effects. However, increased cannibalism in polar bears was postulated and thought to be a result of nutritional stress brought on by climate change (Derocher et al. 2004).

Climate change

Warming-induced habitat degradation and loss are negatively affecting some polar bear stocks, and unabated global warming will ultimately reduce the worldwide polar bear population (Obbard et al. 2010). Loss of sea ice habitat due to climate change is identified as the primary threat to polar bears (Schliebe et al. 2006, USFWS 2008a, Obbard et al. 2010). Patterns of increased temperatures, earlier spring thaw, later fall freeze-up, increased rain-on-snow events (which can cause dens to collapse), and potential reductions in snowfall are also occurring. In addition, positive feedback systems (i.e., sea-ice albedo) and naturally occurring events, such as warm water intrusion into the Arctic and changing atmospheric wind patterns, can amplify the effects of these phenomena. As a result, there is fragmentation of sea ice, reduction in the extent and area of sea ice in all seasons, retraction of sea ice away from productive continental shelf areas throughout the polar basin, reduction of the amount of heavier and more stable multi-year ice, and declining thickness and quality of shore-fast ice (Parkinson et al. 1999, Rothrock et al. 1999, Comiso 2003, Fowler et al. 2004, Lindsay and Zhang 2005, Holland et al. 2006, Comiso 2006, Serreze et al. 2007, Stroeve et al. 2008). These climatic phenomena may also affect seal abundances, the polar bear's main food source (Kingsley 1979, DeMaster et al. 1980, Amstrup et al. 1986, Stirling 2002). However, threats to polar bears will likely occur at different rates and times across their range, and uncertainty regarding their prediction makes management difficult (Obbard et al. 2010).

In 2007, a USGS science team released 9 reports[1] to the Service that included (1) new observational data on polar bears, including updated information on the current status of 3 of the world's 19 subpopulations of polar bears, and (2) projections of the future distribution and abundance of polar bears in the rest of the 21st century, given changes expected in future sea ice conditions.

The overall conclusion of the USGS research effort was that if projected changes in future sea ice conditions are realized, approximately two-thirds of the world's current polar bear population will be lost by the mid-21st century. Because the observed trajectory of Arctic sea ice decline appears to be underestimated by currently available models, this assessment of future polar bear status may be conservative (Amstrup et al. 2007).

[1] Reports are available at: http://www.usgs.gov/newsroom/special/polar_bears/.

While climate change will have the largest impact on polar bears in the marine environment, it may also lead to changes in use and vulnerability of polar bears in the terrestrial environment. An estimated > 60% of females from the SBS stock den on land, with the remaining bears denning on drifting pack ice (Fischbach et al. 2007). Durner et al. (2006) noted that ice must be stable for ice-denning females to be successful. As climate change continues, the quality of sea ice may decrease, forcing more females to den on land (Durner et al. 2006). However, if large areas of open water persist until late winter due to a decrease in the extent of the pack ice, females may be unable to access land to den (Stirling and Andriashek 1992).

Climate change may affect the availability and quality of denning habitat on land. Durner et al. (2006) found that 65% of terrestrial dens found in Alaska between 1981 and 2005 were on coastal or island bluffs. These areas are suffering rapid erosion and slope failure as permafrost melts and wave action increases in duration and magnitude. In all areas, dens are constructed in autumn snowdrifts (Durner et al. 2003). Changes in autumn and winter precipitation or wind patterns (Hinzman et al. 2005) could significantly alter the availability and quality of denning habitat.

Polar bears' use of coastal habitats in the fall during open-water and freeze-up conditions has increased since 1992 (USFWS 2006). This may increase the number of human – polar bear interactions if bears occur close to human settlements or development. Amstrup (2000) observed that direct interactions between people and bears in Alaska have increased markedly in recent years. The number of bears taken for safety reasons, based on three-year running averages, increased steadily from about 3-per-year in 1993, to about 12 in 1998, and has averaged about 10 in recent years. There are several plausible explanations for this increase. It could be an artifact of increased reporting, or of increased polar bear abundance and corresponding probability of interactions with humans. Alternatively, or in combination, polar bears from the SBS and CS populations typically move from the pack ice to the near shore environment in the fall to take advantage of the higher productivity of ice seals over the continental shelf. In the 1980s and early 1990s, the near shore environment would have been frozen by early or mid October, allowing polar bears to effectively access seals in the area. Since the late 1990s, the timing of ice formation in the fall has occurred later in November or early December, resulting in an increased amount of time that the area was not accessible to polar bears. Consequently, bears spent a greater amount of time on land and not feeding. The later formation of near-shore ice increases the probability of bear-human interactions occurring in coastal villages (Schliebe et al. 2006). Some experts predict the number of polar bear–human interactions will increase as climate change continues (Derocher et al. 2004).

Summary

Primary threats to polar bears in the Action Area relate to increased use of coastal habitats by non-denning bears and increased use of maternal denning habitat on land resulting from climate change, which exposes polar bears to the effects of human activities in these areas with greater frequency. While other stressors exist and are managed, they are not currently thought to be significant threats to polar bear populations; however, each of these factors

could become more significant in combination with future effects of climate change and the resultant loss of sea ice.

Polar bear critical habitat

Within the Action Area, habitat within 5 miles of the Beaufort Sea coast is within the Terrestrial Denning Unit and habitat on the Colville River Delta is within the designated boundaries of the Sea Ice Unit, which extends landward into the Delta (Figure 4.2).

Federal actions requiring section 7 consultation

Several ongoing and previously consulted upon Federal Actions that may affect critical habitat in the Action Area have been considered. These include research on polar bears by USGS and FWS, summer activities and research in NPR-A, contaminated site remediation and restoration, and development projects in and close to North Slope villages. While some of the activities in these projects may have small scale, short term, localized impacts to critical habitat PCEs, none of these projects, when considered individually or cumulatively, were determined likely to have significant adverse effects to critical habitat.

Habitat loss and disturbance from oil and gas development

With the exception of state lands subject to non-federal oil and gas leases near Prudhoe Bay, most of the polar bear critical habitat has not been subject to oil and gas development. Although there is potential for future development, and some exploratory activities have been conducted, no development activities or construction of permanent structures has occurred in NPR-A to date. However, CPAI's existing Alpine central processing facility (CD-1) and satellite production pads (CD-2, CD-3, and CD-4) occur within critical habitat. Manmade structures existing on the effective date of the final critical habitat rule, January 6, 2011, and the land on which they are located are excluded from critical habitat. However, human activities (e.g., noise produced by equipment and visual stimuli) at these facilities may interfere with the capability of critical habitat adjacent to facilities to provide their intended function. For example, polar bears may alter travel routes to avoid contact with these facilities, and avoid denning, hunting, and resting near existing structures. Interactions and adverse effects to polar bears from these existing oil and gas activities have been minimized by implementation of the Beaufort Sea ITRs (USFWS 2006, 2011) promulgated under the MMPA. We expect that measures implemented to minimize incidental take of polar bears have also minimized effects to the conservation role of polar bear critical habitat in this area.

Habitat loss and disturbance from villages

Villages occur in terrestrial denning and barrier island units, but as villages are typically discrete boundaries, effects to polar bear critical habitat are likely to be localized. The features of the PCEs most likely to be negatively affected by the presence of villages are those related to human disturbance. Residential development is not thought to be a significant threat to critical habitat (USFWS 2009); accordingly, villages have probably had a limited effect on the environmental baseline of polar bear critical habitat. There are no villages within the Action area. The closest community is Nuiqsut, which is located several miles south the Action area.

Environmental contaminants
Exposure to environmental contaminants may affect polar bear survival or reproduction. Thus, the presence of contaminants within polar bear critical habitat could affect the conservation value of the habitat. Three main types of contaminants in the Arctic are thought to pose the greatest potential threat to polar bears: petroleum hydrocarbons, persistent organic pollutants (POPs), and heavy metals.

To date, no major oil spills have occurred in the Beaufort or Chukchi Seas; therefore, petroleum hydrocarbon contamination from oil and gas development has not degraded the environmental baseline of the sea ice and barrier island units of polar bear critical habitat. Spills have occurred in terrestrial areas, but have affected a limited area, and are not thought to have compromised the conservation function of the terrestrial denning unit.

Contamination of the Arctic and sub-Arctic regions through long-range transport of pollutants has been recognized for over 30 years (Bowes and Jonkel 1975, Proshutinsky and Johnson 2001, Lie et al. 2003). Arctic ecosystems are particularly sensitive to environmental contamination due to the slower rate of breakdown of POPs, including organochlorine compounds (OCs), relatively simple food chains, and the presence of long-lived organisms with low rates of reproduction and high lipid levels that favor bioaccumulation and biomagnification. Consistent patterns between OC and mercury contamination and trophic status have been documented in Arctic marine food webs (Braune et al. 2005). Presumably, these characteristics have affected the capacity of polar bear critical habitat to support polar bears, although is difficult to estimate the extent of impairment.

Climate change
Climate change is contributing to the rapid decline of sea ice throughout the arctic, and some of the largest declines are predicted to occur in the Chukchi and southern Beaufort Seas (Durner et al. 2009 *in* USFWS 2009). This directly affects the sea ice PCE, which provides feeding, breeding, denning, and traveling habitat for polar bears. The decrease in the quality and quantity of sea ice may increase the importance of barrier island and terrestrial habitat for foraging, denning, and resting. For example, Schliebe et al. (2006) demonstrated an increasing trend in the number of observed polar bears using terrestrial habitats in the fall. Additionally, Fischbach et al. (2007) hypothesized that reduced availability of older, more stable sea ice is contributing to the observed decrease in the proportion of female polar bears denning on sea ice in northern Alaska.

Climate change may also affect the availability and quality of denning habitat on land. Durner et al. (2006) found that 65% of terrestrial dens found in Alaska between 1981 and 2005 were on coastal or island bluffs. These areas are suffering rapid erosion and slope failure as permafrost melts and wave Action increases in duration and magnitude. In all areas, dens are constructed in autumn snowdrifts (Durner et al. 2003). Changes in autumn and winter precipitation or wind patterns (Hinzman et al. 2005) could significantly alter the availability and quality of snow drifts for denning.

Summary of the status of polar bear critical habitat in the Action Area
Localized effects to critical habitat in the Action Area (Figure 4.2) have been small in scale, including potential disturbance from existing oil infrastructure on the Colville River Delta and the effects of small oil spills. At a larger spatial scale, globally distributed pollutants and climate change have diminished the quality of polar bear critical habitat; however, estimating the magnitude of these effects within the Action Area is difficult.

5. EFFECTS OF THE ACTION ON LISTED SPECIES

This section of the BO provides an analysis of the effects of the action on listed species and, where appropriate, critical habitat. Both direct effects (effects immediately attributable to the action) and indirect effects (effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur) are considered. Interrelated and interdependent effects of the action are also discussed.

Effects to spectacled eiders
Effects to spectacled eiders from the ASDP were analyzed in the 2004 BO. The 2004 analysis considered effects of oilfield disturbance, including aircraft overflights and watercraft support; direct and indirect habitat loss; collisions with oilfield infrastructure; increased predator populations; increased subsistence activity; oil spills; and toxic contaminants. After reviewing the current status and baseline of spectacled eiders, we have determined that the effects analysis presented in the 2004 BO remains valid and these effects are not wholly reanalyzed in this BO. However, because of changes in project design and other new information, we reexamined the potential effects of collisions, predators (ravens), and habitat loss. This analysis is provided below.

Collisions with oilfield infrastructure
The 2004 BO estimated that 3 spectacled eiders could be killed by collisions ASDP infrastructure. This estimate was based on limited data on common eider (*Somateria mollissima*) strikes to Northstar Island, which is located north of Prudhoe Bay in the Beaufort Sea Outer Continental Shelf, and predicted drill rig activity in 2005–2010 (5 rig/years) and 2010–2011 (4 rig/years). Although this time frame would be shifted forward in the revised permit package to 2015 and beyond (until up to 33 wells are competed at the CD-5 drill site), we do not anticipate that the proposed Action would result in increased risk of collision mortalities beyond the estimate of three spectacled eiders provided in the 2004 BO. This conclusion is based on the assumption that drilling effort anticipated by CPAI is consistent with that evaluated in the 2004 BO (information on drilling effort is not provided in the revised permit package). We also note that no collisions of spectacled eiders with ASDP infrastructure have occurred to date.

Increased nest depredation by ravens
New infrastructure may also provide nesting substrate for ravens. Ravens appear to have expanded their breeding range on the North Slope by utilizing buildings and other manmade structures for nest sites (Day 1998). Day (1998) interviewed a number of biologists who work on the North Slope and many felt that ravens may be highly efficient egg predators. Ravens were observed depredating 5 Steller's eider nests near Barrow during 5 nesting years[2] between 1992 and 1999 (Quakenbush et al. 2004) and are capable of displacing female Steller's eiders and removing whole eggs from a nest (Quakenbush et al. 1995). A raven also was responsible for one of four failures of camera-monitored Steller's eider nests near Barrow in 2007 (Rojek 2008).

Estimating the effects of ravens on spectacled eider production in the Action Area is extremely difficult; however, we anticipate that ravens may depredate spectacled eider nests if ravens are able to establish nests on oilfield infrastructure. Thus, the Service appreciates CPAI's continued commitment to minimize nest locations by consulting with USFWS during the design process to minimize the availability of potential nest sites and to manage food waste at CD-5 facilities to ensure the facilities do not attract and support production of ravens.

Estimating the effects of direct and indirect habitat loss
Direct habitat loss will result from placement of gravel to construct the CD-5 facility, the access road, the tie-in module pad, and the Nigliagvik valve pad. This area of gravel fill would be rendered permanently unavailable as breeding habitat for eiders. We also anticipate that indirect habitat loss will occur within a 200-m (656.17-ft) zone of influence surrounding new development through disturbance from on pad activities.

The two principal mechanisms through which disturbance can adversely affect eiders on their breeding grounds are:
1. Displacing adults and/or broods from preferred habitats during pre-nesting, nesting, brood rearing, and migration; and
2. Displacing females from nests, exposing eggs or small young to inclement weather or predators.

The 2004 BO provided an estimate of annual loss of spectacled eider production resulting from loss of habitat during implementation of the ASDP, but also acknowledges the low precision of these estimates. In the discussion below, we provide an assessment of potential loss of production resulting from the proposed CD-5 project. This assessment uses updated estimates of spectacled eider density in the Action Area based on more recent waterfowl breeding population survey data from the region (Larned et al. 2011). These estimates were developed at a coarse, regional scale and are not site-specific; however, they reflect the best available data on the density of the Action Area by breeding spectacled eiders. It is

[2] Steller's eiders have highly variable nesting effort among years and nest s are not detected near Barrow in about 50% of years.

important to note that distributions on a local scale may vary based on the availability of preferred habitats.

Direct loss of habitat would occur by placement of gravel onto approximately 58 acres (0.24 km^2) of tundra wetlands during construction of the pads and access road. We expect indirect habitat loss will occur through displacement of eiders within a 200-m zone of influence surrounding gravel pads and along each side of the access road and the pipeline. The area encompassed by the zone of influence, the area of total habitat loss, is estimated to be 1,978 acres (8.00 km^2). Although we expect the zones of influence associated with the access road and the pipeline to overlap considerably, we do not have enough information to assess the extent of overlap and included both in our calculation of total habitat loss to ensure we have not underestimated potential effects to spectacled eiders. Additional details on estimation of total habitat loss are presented in Appendix A.

Spectacled eider density polygons constructed from the 2007–2010 waterfowl breeding population survey of the ACP (Larned et al. 2011; Figure 4.1) provide our best estimate of spectacled eider nesting effort in the Action Area. Density polygons were used to estimate incidental take by multiplying approximate density by the estimated footprint size. Spectacled eider density in the Action Area is estimated at 0.029–0.111 birds/km^2. We applied the upper limit of this range (0.111 birds/km^2) to be conservative because higher concentrations of spectacled eiders occur near the Action Area (Figure 4.1).

The potential number of spectacled eider pairs displaced by the proposed Action per year was estimated by multiplying the estimated spectacled eider density (0.111 birds/km^2) by the extent of the affected area (0.42 km^2). We assume that the estimated number of pairs displaced is equivalent to the number of nests or young broods that may also be affected. We also assume that spectacled eiders will be present and attempt to nest annually in the Action Area. The potential loss of production in terms of numbers of eggs or ducklings lost was based on an average clutch size of 3.9 for spectacled eiders in northern Alaska (Petersen et. al. 2000, Bart and Earnst 2005, Johnson et al. 2008).

Loss of production of up to one nest or 4 eggs/ducklings per year was estimated as follows:

0.111 birds/km^2 × 0.5 nests/pair × 8.00 km^2 = 0.44 nests per year

1 nest × 3.9 eggs or ducklings per nest = 3.9 eggs or ducklings per year

Loss of production of 14 nests or 55 eggs/ducklings over an assumed 32-year project life[3] was estimated as follows:

0.111 birds/km^2 × 0.5 nests/pair × 8.00 km^2 × 32 years = 14.22 nests over 32 years

15 nests × 3.9 eggs or ducklings per nest = 58.5 eggs or ducklings over 32 years

[3] Two years of construction and 30 years of production

To summarize, we estimate that the proposed Action will result in the loss of 4 spectacled eider eggs or ducklings per year or 59 eggs or ducklings over an assumed 32-year project life through direct loss of breeding habitat and disturbance within a 200-m zone of influence surrounding the project components.

5.2 Effects to polar bears

Adverse effects to polar bears may result from the Action through habitat loss; disturbance; increased polar bear–human interactions; and oil spills and toxic contamination

Habitat Loss
Gravel pads, access roads, and other components of the Action would impact approximately 58.5 acres (0.24 km^2) of tundra habitat. Polar bears use coastal areas for denning, hunting, and travel corridors, and we suspect with changing ice patterns more polar bears will be encountered on land in the future. While individual females generally den in the same habitat type as they used previously, such as sea ice or terrestrial sites, they do not appear to reuse the same site (Amstrup and Garner 1994). Terrestrial dens in Alaska are sparsely distributed along a narrow coastal strip, with observations up to 61 km (37.9 mi) inland (Amstrup and Gardner 1994). Denning habitat includes coastal bluffs, along river banks, and bluffs where snow accumulates early (Durner et al. 2003). It is possible a small amount of potential denning habitat may be destroyed or altered by development activities, however, denning habitat is not limiting population size, and adverse effects from habitat loss are not anticipated (C. Perham, USFWS- Marine Mammals Management Office *pers. comm.* in USFWS 2008).

Disturbance
Disturbance from industrial activities may cause individual bears to move away or avoid the area of activity. There is, however, some evidence that polar bears exposed to routine industrial noises may acclimate to those noises and show less vigilance than bears not exposed to such stimuli (Smith et al. cited by USFWS 2006).

Although den sites have also been recorded within 2.8 km (1.74 mi) of a production facility (USFWS 2006), female polar bears with cubs, especially in dens, are thought to be more sensitive than other age and sex groups to disturbance (Amstrup and Gardner 1994). If disturbance coincides with the initiation of denning by a pregnant female polar bear, there is a possibility the preferred denning site may be avoided. Industrial noise and activities that commence after the female has denned (e.g., seismic surveys, ice road construction, or winter pipeline maintenance) may cause a female to abandon the den site before the cubs are developed enough to survive outside. Such den abandonment due to human disturbance was described in January 1985 when a female polar bear was believed to have abandoned her den as a result of disturbance from rolligon traffic, which occurred between 250 m and 500 m (820 ft and 1,640 ft) from the den site. Researcher disturbance, created by camp proximity and associated noise, which occurred during a den emergence study in 2002 on the North Slope, may have caused a female bear and her cub(s) to abandon their den and move to the

ice sooner than necessary. Information indicates events such as these have been infrequent and isolated (USFWS 2006). Post-emergence, females and cubs spend an average of 8 days in the area before the den site is abandoned (USGS data cited by USFWS 2006). These bears may be particularly susceptible to disturbance at this time. However, the facilities associated with CD-5 will be in regular use (activities on the CD-5 pad, access road, etc.), which would allow a denning polar bear to either become habituated to or move away from the disturbance, significantly reducing the likelihood of these effects.

Routine aircraft traffic is not anticipated to adversely affect polar bears in the Action Area. Amstrup (1993) studied the response of denning bears to research aircraft and found no detectable motion among collared bears in their dens when flights took place. Reactions of non-denning polar bears appear limited to short-term changes in behavior. Hence, no long-term adverse impacts to individuals from aircraft activities are anticipated.

Operations at the CD-5 facility and may disturb and displace individual polar bears from the immediate area. Given the sparse distribution of polar bears on the North Slope, and their limited use of the Action Area, adverse effects from disturbance are anticipated to be infrequent and affect few individuals.

The Service expects that these effects will be reduced further by CPAIs compliance with existing and future authorization issued under the MMPA, such as LOAs issued under the Beaufort Sea ITRs. Disturbance that disrupts behavioral patterns of polar bears is classified as take under the MMPA. The MMPA prohibits incidental take of marine mammals unless specific ITRs have been promulgated under section 101(a)(5) of the MMPA and a subsequent LOA has been issued. Under the MMPA, incidental take is only permitted provided the total of such taking will have no more than a negligible impact[4] on the marine mammal species (or stock in the case of the Beaufort Sea ITRs), and does not have an unmitigable adverse impact[5] on the availability of these species for subsistence uses. Additional information on measures implemented under these regulations to reduce effects to polar bears from oil and gas industry activities can be found in the BO for the 2011 Beaufort Sea ITRs (USFWS 2011).

[4] Negligible impact - an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

[5] Unmitigable adverse impact - is an impact resulting from the specified activity (1) that is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by (i) causing the marine mammals to abandon or avoid hunting areas, (ii) directly displacing subsistence users, or (iii) placing physical barriers between the marine mammals and the subsistence hunters; and (2) that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

Increased polar bear–human interactions
Polar bear–human encounters can be dangerous for both the polar bear and human. For the bear, a human encounter may result in the bear being hazed away from the area or, in the worst case, being killed in defense of life and property.

While loud noises may deter bears from entering an area of operation, polar bears are curious and commonly approach noise sources, such as industrial sites (Stirling 1988). All phases of project development, from seismic surveys, through exploratory drilling, ice road construction, and production activities including pipeline maintenance will create noise that may be a bear attractant. Although currently rare (USFWS 2006), chance encounters between polar bears and humans are likely to increase as more development activities occur in winter in the Action Area.

Authority to harass (haze) polar bears may be requested under section 112(c), and/or 101(a)(4)(A) of the MMPA, which allows the Service to set up cooperative agreements with industry or other publics, and under sections 109(h) which states that a person may take a marine mammal in a humane manner if such taking is for: (a) protection or welfare of the mammal; (b) protection of public health and welfare; or (c) non-lethal removal of nuisance animals. This type of action is considered Level B Harassment[6]. Although hazing may have some short term adverse effects by displacing a bear, the safe removal of a bear to non-industrial areas may prevent more serious impacts to the bear possibly including lethal take in defense of life and property. Since the implementation of ITRs, LOAs, and authorization of intentional take, only two polar bears are known to have been killed due to encounters with industry on the North Slope of Alaska. In contrast, 33 polar bears were killed in the Canadian Northwest Territories from 1976 to 1986 during encounters with industry (Stenhouse et al. 1988).

Oil Spills and Toxic Contamination
Oil and toxic substance spills are predicted to result from the Action, and oil is known to be highly toxic to polar bears (St. Aubin 1990). Bears can be affected by contacting spilled oil or ingesting contaminated prey (Stirling 1990). The size, location, and timing of a spill will determine the number of polar bears affected.

Polar bears are sparsely distributed in the Action Area, which is located >2 miles (3.2 km) inland from the coast. Thus, a small spill on the tundra is unlikely to contact polar bears, even if it entered lakes and tundra wetland complexes. A large spill that enters marine waters through streams and rivers in the action area has the potential to contact, and kill, polar bears or their prey (e.g. Amstrup et al. 2006). However, a large spill cannot be said to be reasonably certain to occur.

[6] Level B Harassment - has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Because small spills are expected to be infrequent and affect only a small portion of the Action Area and given the extremely low density of polar bears in the area, the Service does not anticipate adverse effects from small spills. Although large spills reaching marine waters could potentially impact polar bears directly and indirectly through effects to their prey, a large spill cannot be said to be reasonably certain to occur.

Polar Bear Critical Habitat

In our effects analysis, we analyzed how the PCEs are likely to be affected and how that is likely to influence the function and conservation role of each PCE at the unit scale. We assumed if the function of any one PCE at the individual critical habitat unit scale was not likely to be appreciably reduced, then it follows that adverse modification for the total polar bear critical habitat would not likely occur.

Effects on sea ice habitat

Activities will primarily occur on land within and east of the Colville River Delta.
We anticipate the only risk to the sea ice PCE would be oil product spills that reach the marine environment directly or indirectly via rivers. The fate and behavior of spills into marine waters would depend on several factors, including the amount of open water, and the direction and velocity of ocean currents. Spills in open water during summer months would spread more than spills on or under ice. Spills in the arctic may be more difficult to respond to than spills in other environments. The amount of sea ice affected would be determined largely by the amount of material spilled, conditions at the time of spill, and the effectiveness of response.

While the conservation role of polar bear critical habitat could be affected by a large spill, the likelihood that a large spill will occur is very low and cannot be considered reasonably certain to occur, and thus, are not considered indirect effects of the Action under the ESA. Additional information on the potential effects of a large oil spill on polar bear critical habitat is provided in the BO on polar bears (*Ursus maritimus*) and polar bear critical habitat for the Beaufort Sea ITRs (USFWS 2011a) and in the Large Oil Spill Analysis included in the ITRs[7] (USFWS 2011b) authorizing the non-lethal, incidental take of small numbers of polar bears and Pacific walruses during year-round oil and gas operations in the Beaufort Sea and adjacent northern coast of Alaska. Further, oil spill prevention and response measures would be implemented in compliance with State and Federal regulations to reduce risks to sea ice habitat associated with the operation of a sales pipeline.

Small spills are more likely to occur and could result in adverse effects to critical habitat. Localized areas of critical habitat may be temporarily unsuitable for polar bears due to disturbance from cleanup activities and the presence of contaminants. However, effects to the conservation role of critical habitat resulting from a small spill are expected to be minor due to the temporary nature and small scale of potential impacts. Because we evaluate potential adverse effects to critical habitat at the unit scale, the area conceivably affected by a

[7] Both documents can be accessed online at http://alaska.fws.gov/fisheries/mmm/itr.htm

small spill would likely represent a very small portion of the 179,508 mi^2 of sea ice habitat designated as the Sea Ice Unit.

In summary, adverse effects of the Action are not likely to substantially impact the conservation role of the Sea Ice Unit because 1) in the event that an oil spill occurs over land, oil is unlikely to reach sea ice habitat; 2) annual sea ice melt and formation of new sea ice near shore precludes long term effects to the physical features of sea ice habitat from any single event; 3) large oils spills cannot be considered reasonably certain to occur; and 4) the scale of the area potentially affected by small spills would be small relative to the extent of the sea ice unit such that the integrity of the unit as a whole would not be compromised.

Effects on terrestrial denning habitat
The proposed Action may alter the physical features of terrestrial denning habitat through the construction of ~6 miles of gravel road and pipeline and ~58 acres of gravel pads. Temporary effects to terrestrial denning habitat could result from construction of ice/snow roads and pads in support of construction and operations. Additionally, activities that may occur in the Action area could be a source for disturbances that may affect the conservation role of terrestrial denning habitat.

Topographic features – The terrestrial denning PCE is characterized by steep, stable slopes that accumulate snow. Certain areas such as barrier island, river banks, and coastal bluffs that occur at the interface of mainland and marine habitat receive proportionally greater use for denning (Durner et al. 2004, 2006), with coastal bluffs providing the most preferred topographic relief. For example, of 35 terrestrial dens found on the ACP in 2001, >80% were along coastal bluffs (Durner et al. 2003).

The proposed Action could result in modifications of some slopes and limit their capability to catch snow. We expect that alteration of slopes during construction is likely to be minimal, and, in fact, largely avoided because construction and use of steep terrain is more difficult than flat areas. Additionally, ice roads would likely be constructed in the same general areas annually. Therefore, we expect only a small area containing suitable topographic features for denning would be affected.

Features related to polar bear movement and absence of disturbance – A disturbance may affect critical habitat if it persists and affects the critical habitat's conservation role. Features of the terrestrial denning habitat PCE that relate to disturbance include 1) unobstructed, undisturbed access between den sites and the coast and 2) the absence of disturbance from humans and human activities that might attract other polar bears (i.e., non-denning polar bears which may kill females and cubs in dens).

Given the limited extent of development anticipated in polar bear critical habitat, and the existing restrictions in place, it is unlikely the Action will significantly hinder movement between den sites and the coast through physical obstructions or disturbance.

Human activity could also reduce the quality of terrestrial denning habitat by providing attractants (such as food and scents) that could attract adult male bears, which may kill females and cubs, to nearby dens. Disturbance and attractants resulting from the Action would be most likely to occur where human presence is concentrated or prolonged, such as drilling sites and staging areas. However, we expect that these effects will be reduced by CPAIs compliance with existing and future authorization issued under the MMPA (see *Effects to Polar Bears* section, page 45), which include terms and conditions to minimize effects to denning bears and manage human food waste. Thus, both the level of human activity within preferred denning habitat and the presence of attractants to non-denning polar bears will be limited.

Summary of potential effects to the Terrestrial Denning Unit –Adverse effects of the Action are not expected to substantially impact the conservation role of the Terrestrial Denning Unit because 1) we expect development in areas where topographic relief produces optimal denning habitat, such as river and coastal bluffs to be limited; 2) terms and conditions associated with authorizations under the MMPA would minimize the level of persistent disturbance that may result from the Action; and 3) the scale of the potentially affected area would be small relative to the extent of the Terrestrial Denning Unit such that the function of the unit as a whole would not be compromised.

Effects on barrier island habitat
Because the Action Area does not include to occur in barrier island habitat, we do not anticipate adverse effects to the Barrier Island Unit.

5.4 Interdependent and Interrelated Effects

Implementation of the proposed Action may facilitate additional oil and gas industry development, including additional Alpine satellite facilities and associated infrastructure. For example, CPAI indicated in their project description for the CD-5 Development Project, dated October 19, 2011 that they intend to submit future permit applications for the Greater Mooses Tooth Satellites, GMT-1 and GMT-2 (formerly CD6 and CD7 in the ASDP FEIS), following successful permitting and construction of the proposed Action. However, Federal permits required for these activities would also require the Action Agency to initiate consultations pursuant to section 7 of the ESA for these actions.

6. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. When analyzing cumulative effects of a proposed action, it is important to define both the spatial (geographic), and temporal (time) boundaries. Within these boundaries, the types of actions that are reasonably foreseeable are considered.

Future development by the State of Alaska or local communities may occur in the area through developments like improved roads, transportation facilities, utilities or other infrastructure. However, the entire action area, and the undeveloped lands surrounding are wetlands, and are therefore subject to Section 404 permitting requirements by the U.S. Army Corps of Engineers. This permitting process would serve as a federal nexus, and hence trigger a review of any major state or borough construction project in the area.

7. CONCLUSION

After reviewing the proposed action; the current status of spectacled eiders, polar bears, and polar bear critical habitat, the environmental baseline for these species and critical habitat the action area; the effects of the proposed action; and the cumulative effects, it is the Service's biological opinion that the CD-5 project, as described in this BO, is not likely to jeopardize the continued existence of the spectacled eider or the polar bear and is not likely to destroy or adversely modify designated critical habitat for polar bear.

Regulations (51 CFR 19958) that implement section 7(a)(2) of the ESA define "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."

Spectacled eiders

Effects to spectacled eiders from the ASDP were analyzed in the 2004 BO. The 2004 analysis considered effects of oilfield disturbance, including aircraft overflights and watercraft support; direct and indirect habitat loss; collisions with oilfield infrastructure; increased predator populations; increased subsistence activity; oil spills; and toxic contaminants. The Service determined that collisions and habitat loss resulting from the ASDP were likely to adversely affect the spectacled eider, but these effects were not likely to jeopardize the continued existence of the spectacled eider.

After reviewing the current status and baseline of spectacled eiders, we have concluded that the effects analysis presented in the 2004 BO remains valid with respect to the proposed Action. However, we also presented updated information and analysis on potential collisions, predators (ravens), and habitat loss to supplement the 2004 analysis with regard to the proposed Action considered in this BO. We determined that the proposed Action is not likely to result in additional spectacled eider mortalities from collisions beyond the 3 adult mortalities estimated in the 2004 analysis; however, it is likely to cause additional adverse effects to spectacled eiders through habitat loss when revised estimates of spectacled eider density and the area of affected habitat are considered. Using methods and logic explained in the *Effects of the Action* section, the Service estimates that 59 spectacled eider eggs/ducklings

(15 nests) would be lost resulting from long-term habitat loss over an assumed 32-year project life.

The population of North Slope-breeding spectacled eiders was last estimated at 12,916 in 2006 (10,942–14,890 95% CI; Stehn et al. 2006). If we were to assume that 100% of eggs/ducklings are recruited into the adult population, the proposed action would result in the loss of approximately 0.46 % of the North Slope-breeding spectacled eider population. However, we expect that population-level effects of the proposed action would be substantially lower because only a small proportion of spectacled eider eggs or ducklings on the North Slope would eventually survive to recruit into the breeding populations. It is important to note that the loss of eggs or ducklings is of much lower significance for survival and recovery of spectacled eiders than the death of an adult bird. For example, spectacled eider nest success recorded on the Y-K Delta ranged from 18-73% (Grand and Flint 1997). From the nests that survived to hatch, spectacled eider duckling survival to 30-days on the Y-K Delta ranged from 25-47% (Flint et al. 2000). Over-winter survival of one-year old spectacled eiders was estimated at 25% (Flint pers. comm.), and annual survival of 2-year old birds (which may enter the breeding population) 80% (Grand et al. 1998). Using these data we estimate for every 100 spectacled eider eggs laid on the Y-K Delta that 1–7 may survive to enter the breeding population. Similarly, we expect that only a small proportion of spectacled eider eggs or ducklings on the North Slope would eventually survive to maturity. Thus, we believe the estimated of loss of production from the CD-5 project will not significantly affect the likelihood of survival and recovery of spectacled eiders.

In conclusion, it is the Services' biological opinion that the proposed Action is not likely to jeopardize the continued existence of the spectacled eider.

Polar bears

We have assessed potential impacts to polar bears to ensure activities that may result from the Action do not jeopardize the continued existence of the species as required under section 7(a)(2) of the ESA. As described in the *Effects of the Action*, activities that may result from the Action could adversely affect polar bears through disturbance, an increase in polar bear-human interactions, and spills of oil and toxic substances. Although oil and toxic substance spills could result in mortality of polar bears, the low density of polar bears using terrestrial habitat in the Action Area at any given time and the low probability of a large spill occurring make acute exposure of polar bears to toxins resulting from the proposed Action unlikely. Thus, no lethal take is anticipated to occur as a result of spills associated with the Action. A small numbers of polar bears may be adversely affected through disturbance or polar bear-human interactions which may include intentional take. These adverse effects and mortality are expected to impact only the Southern Beaufort Sea polar bear stock and population level impacts to the species are not anticipated.

Polar bear critical habitat

This conclusion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. 402.02. Instead, we have relied upon the

statutory provisions of the ESA to complete our analysis with respect to critical habitat. After considering the status of polar bear critical habitat, the environmental baseline, cumulative effects, and effects of the proposed Action on each PCE, we conclude the proposed Action may adversely affect but *is not likely to destroy or adversely modify polar bear critical habitat*. This conclusion was based on the following factors:

1) The scale of potentially affected sea ice and terrestrial denning habitat within the Action Area is small relative to the spatial extent of the Sea Ice Unit and the Terrestrial Denning Unit such that the conservation roles of those critical habitat units, in their entirety, would not be compromised.
2) Proposed activities are not expected to occur in the Barrier Island Unit.

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, respectively, 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 by the Service 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 that include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action, is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

Spectacled eiders

As described in Section 5, *Effects of the Action*, the activities described and assessed in this BO may adversely affect spectacled eiders through collisions with oil field infrastructure and direct and indirect long-term habitat loss.

In the ITS of the 2004 BO (2004 ITS), the Service indicated that 3 spectacled eider adults were likely to be taken as a result of being killed in collisions with infrastructure. The Service has determined that the proposed Action is not likely to result in additional take of spectacled eiders from collisions beyond that issued in the 2004 ITS.

The Service has determined that additional incidental take may result from the proposed Action through habitat loss. Long-term habitat loss would occur directly from placement of gravel fill and indirectly through disturbance associated with facility and road operation. Methods used to estimate loss of spectacled eider production resulting from long-term habitat loss are described in the *Effects of the Action* section. Based on these estimates of loss of

spectacled eider production, the Service anticipates that *59 spectacled eider eggs or ducklings* are likely to be taken may result from the proposed Action through long-term direct and indirect habitat loss (harm).

While the incidental take statement provided in this consultation satisfies the requirements of the ESA, it does not constitute an exemption from the prohibitions of take of listed migratory birds under the more restrictive provisions of the Migratory Bird Treaty Act. However, the Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions specified herein.

Polar bears

The Service cannot provide incidental take authorization for polar bears for those activities that may occur as a result of the Action in this BO where incidental take of marine mammals has not been authorized under section 101(a)(5) of the MMPA. In most cases following issuance of such regulations or authorizations, the Service would amend this BO. However, we anticipate authorizing incidental take of polar bears through consultation on the issuance of ITRs and LOAs under the MMPA. Similarly, this document cannot issue incidental take for activities that may result in intentional take of polar bears as defined under sections 101(a)(4)(A), 109(h), and 112(c) of the MMPA. Authorization of intentional harassment will be subject to subsequent review under the ESA.

USACE has a continuing duty to regulate the activity covered by this Incidental Take Statement (ITS) as well as the ITS from the 2004 BO. If USACE (1) fail to assume and implement the terms and conditions or (2) fail 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.

9. REASONABLE AND PRUDENT MEASURES

After reviewing the original 2004 Biological Opinion[8] (BO), which addressed effects of the project to spectacled eiders, and information available in the revised USACE permit package for the CD-5 facility, we have concluded that no additional reasonable and prudent measures (RPMs) or terms and conditions (T&Cs) are required for spectacled eiders. However, the reasonable and prudent measures, and terms and conditions, established in the 2004 BO are still applicable to the proposed CD-5 project.

Likewise, we have not identified RPMs or T&Cs for polar bears. However, the Service anticipates that CPAI would obtain and comply with the terms and conditions of a LOA under the Beaufort Sea ITRs, pursuant to the MMPA.

[8] The 2004 BO resulted from consultation with BLM as the lead action agency and USACE as a cooperating agency regarding the Alpine Satellite Development Project

10. CONSERVATION RECOMMENDATIONS

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. In addition to conservation recommendations provided in the 2004 BO, we recommend the following action be implemented across all phases of this proposed action:

> Ravens are known to depredate eider nests near Barrow, AK (Quakenbush et al. 2004, Rojek 2008) and are potential predators of spectacled eider eggs on the North Slope. The Service appreciates CPAI's commitment to consult with USFWS during the design process to minimize available nesting locations and develop deterrent methodologies for ravens (CPAI letter to USACE, November 18, 2011). The Service recommends that CPAI remove any nest materials from accessible raven nest locations prior to egg laying, in addition to developing and implementing techniques designed to render their structures unattractive to breeding ravens.

11. REINITIATION NOTICE

This concludes formal consultation with the USACE for the CD-5 Alpine Satellite Facility (ConocoPhillips Alaska, Inc.). 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 species 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 concern for endangered species and for your cooperation in the development of this Biological Opinion. If you have any comments or require additional information, please contact Sarah C. Conn, Field Supervisor, Fairbanks Fish and Wildlife Field Office at (907) 456-0499.
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Appendix A. Estimating direct and indirect spectacled eider habitat loss from the CD-5 project.

The area of total habitat loss was estimated as the area encompassed by a 200-m (656.17-ft) zone of influence surrounding the gravel footprint of the project. Total habitat loss was estimated at 1,978 acres (8.0 km^2; Table A1). The widths of CD-5 pad and access road were estimated by converting the area in acres provided in the revised permit package to square feet and dividing by the stated length. Lengths and widths of the tie-in module and valve pads were calculated based on the area (acres) provided in the revised permit package and assuming a square gravel pad. Width of the pipeline horizontal support member was estimated visually from drawing provided in the revised permit package.

Although we expect the zones of influence associated with the access road and the pipeline to overlap considerably, we do not have enough information to assess the extent of overlap and included both in our calculation of total habitat loss.

Table A1. Values used in habitat loss calculations

	Length (ft)	Width (ft)	Area (ft2)	Area (acres)	Area (km^2)
Direct habitat loss (gravel footprint)					
CD-5 access road	31680	62.84*	1,990,692	45.7	0.1849
CD-5 pad	1200	–	511,394	11.74	0.0475
Tie-in module pad	114.3154*	114.32*	13,068	0.30	0.0012
Nigliagvik valve pad	140.0071*	140.01*	19,602	0.45	0.0018
Pipeline	32208	10*	322,080	7.39	0.0299
Total				65.58	0.2654
Total habitat loss (includes zone of influence))					
CD-5 pad	31680	1375.18	43,565,623	1000.13	4.0475
CD-5 access road	2512.34	1738.50	4,367,708	100.27	0.4058
Tie-in module pad	1426.66	1426.66	2,035,345	46.73	0.1891
Nigliagvik valve pad	1452.35	1452.35	2,109,312	48.42	0.1960
Pipeline	32208	1322.34	42,589,927	977.73	3.9569
Total habitat loss				1977.86	8.0044

*estimated based on information provided in the revised permit package (see text above)

Appendix B. 2004 Biological Opinion for the Alpine Satellite Development Project (USFWS 2004)

FINAL BIOLOGICAL OPINION (09-28-2004)

INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service's) final biological opinion (BO) based on our review of the Bureau of Land Management's (BLM's) biological assessment (BA) for ConocoPhillips Alaska, Inc.'s (CPAI's) proposed Alpine Satellite Development Project (ASDP) located within the Colville River Delta and the eastern planning area of the National Petroleum Reserve-Alaska (NE NPR-A), and its effects on spectacled eiders (*Somateria fischeri*) in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 et seq.). BLM's May 26, 2004, BA and letter requesting formal consultation were received on May 27, 2004. On June 1, 2004 the Service contacted BLM with further information needs concerning the proposed project description. By August 2, 2004 the Service had received letters from both the Army Corps of Engineers (Corps) and the U.S. Coast Guard acknowledging BLM as the lead agency for the ASDP consultation and agreeing to implement any Reasonable and Prudent Measures that are identified in the final BO. On August 2, 2004, the Service sent a letter to BLM stating that all information required to initiate consultation had been received or was otherwise accessible for our consideration and reference. This letter also stated that since we had previously reviewed drafts of the biological assessment (BA) and sections of the Draft Environmental Impact Statement (DEIS), we hoped to deliver our final BO to BLM prior to the 135-day statutory deadline. BLM expects activities under the Preferred Alternative to continue for 35 years. If significant new information becomes available that is not analyzed in the BA, BLM should reinitiate consultation with the Service

The ASDP is within the breeding ranges of spectacled and Alaska-breeding Steller's eiders, both listed as threatened under the Act. The Service believes that the proposed action may likely adversely affect spectacled eiders that breed on Alaska's Arctic Coastal Plain (ACP) near the proposed project sites. Across the ASDP Area (defined as the proposed project footprint and flight path from CD-1 to CD-3 plus a 200 m buffer), we have found that spectacled eiders are unevenly distributed. Spectacled eiders show a general gradient in density from higher in the Northern and Eastern portions of the ASDP Area (CD-3) to lower in the Southern and Southwestern portions (CD-4, 5, 6 and 7). We are particularly concerned with the proposed action because spectacled eiders occur/nest at comparatively high densities in the vicinity of CPAI's proposed CD-3 development within the Colville River Delta. The Service's aerial surveys of the ASDP Area from 1993-2003 found that the mean density of spectacled eiders near CD-3 was 0.58 birds/km^2 as opposed to 0.21 birds/km^2 near CD-4, 0.04 birds/km^2 near CD-5, CD-6 and CD-7 and 0.23 birds/km^2 for the entire ACP (Larned et al. 2003).

The following document assesses the effects of the proposed action on the threatened spectacled eider, in accordance with section 7 of the Act. This BO is based on information provided in BLM's May 27, 2004, BA to evaluate the effects of the proposed development of

5 oil reservoirs as part of the ASDP under the EIS's Preferred Alternative. BLM's EIS addresses the full range of BLM's permitting/management responsibilities in the project area, with changes to the level/route of gravel road access to allow for ground vehicle support as opposed to aircraft support as a major focus. Within the BA, BLM comprised aspects of the DEIS's 5 alternatives to reach its Preferred Alternative. The Preferred Alternative includes activities that may adversely affect threatened spectacled eiders from habitat loss and increased risk of collision to proposed oilfield infrastructure. This impact will not likely jeopardize listed spectacled eider populations breeding on or adjacent to Alaska's Arctic Coastal Plain (ACP).

Based on the information provided on the proposed and potential activities, and the information currently available on listed and proposed species and designated and proposed critical habitat, the Service has determined that it is unlikely that the proposed action will violate section 7(a)(2) of the Act. Section 7(a)(2) of the Act states that Federal agencies must ensure that their activities are not likely to: 1) jeopardize the continued existence of any listed species, or 2) result in the destruction or adverse modification of designated critical habitat. To arrive at this "non-jeopardy" determination, we used a five-step approach for applying the section 7(a)(2) standards. The steps are as follows:

5. Define the biological requirements and current status of North Slope breeding spectacled eiders,
6. Evaluate the relevance of the environmental baseline to the spectacled eider's current status,
7. Determine the effects of the proposed or continuing action on the species,
8. 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, and
9. Identify reasonable and prudent alternatives (RPAs) to a proposed or continuing action when that action is likely to jeopardize the continued existence of a listed species. Thus, this step is relevant only when the conclusion of the previously described analysis for Step 4, above, is that the proposed action would jeopardize listed species. The RPA would have to reduce the mortality associated with the proposed action to a level that does not jeopardize the species.

Alaska-breeding Steller's eiders (*Polysticta stelleri*) are rarely observed within the ASDP Area (much rarer than in areas of relatively high density such as Barrow, Alaska). Aerial surveys conducted by the Service and CPAI in the ASDP Area from 1993-2003 recorded no nesting Steller's eiders. Nest searches conducted by CPAI in the ASDP Area intermittently from 1992-2003 also found no nesting Steller's eiders. Therefore, due to the limited occurrence and absence of nesting of Steller's eiders in the ASDP Area, no adverse impacts to the species are anticipated as a result of the proposed project. Hence, the Service concurs with BLM determination in there BA that this project is not likely to adversely impact Steller's eiders and further consultation for this species under section 7 of the Act is not

necessary (BA page 50). However, historical observations indicate that Steller's eiders may have historically occurred in much higher densities near/in the ASDP Area than they do today. It is possible that Steller's eider densities in the vicinity of the ASDP may increase if the Alaska-breeding population recovers.

In addition to threatened spectacled eiders, the project area 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 NE NPR-A and the Colville River Delta 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 a designated or proposed critical habitat. BLM should not approve any activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended (16 U.S.C. 1531 et seq.), including completion of any required procedure for conference or consultation.

A chronology of consultation actions is provided in Appendix 1. A complete administrative record of this consultation is on file at the Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Room 110, Fairbanks, Alaska 99701. If you have any comments or concerns regarding this BO, please contact Jonathan Priday, Endangered Species Biologist, Fairbanks Fish and Wildlife Field Office at 907/456-0499.

DESCRIPTION OF THE PROPOSED ACTION

Background

Section 7(a)(2) of the Endangered Species Act, (16 U.S.C. § 1531 et seq.), requires that each Federal agency shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action 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 U.S. Fish and Wildlife Service (Service), depending upon the protected species that may be affected. For the actions described in this document, the action agencies are BLM (lead), the Corps (cooperating) and the Coast Guard (cooperating). Due to the protected species involved, the consulting agency is the Service. Section 7(b) of the Act requires that the consultation be summarized in a BO detailing how the action may affect protected species. The purpose of this BO is to fulfill the section 7 requirements for consultation on development of 5 oil reservoirs as part of the ASDP. Section 7 regulations allow a formal consultation to encompass a number of similar actions within a given geographic area or a segment of a comprehensive plan (50 CFR 402.14). This opinion

focuses on the potential effects of proposed construction, support, operation and abandonment of the ASDP on the threatened spectacled eider (*Somateria fischeri*).

Under the ASDP, 2 new developments will be located within the Colville River Delta (CD-3 and CD-4) and 3 new developments will be located within the northeast portion of NE NPR-A (CD-5, CD-6 and CD-7). Land within the Colville River Delta is largely owned/administered by the State of Alaska, CD-6 and CD-7 are located on lands owned/administered by BLM, while CD-5 is on land owned by the Kuukpik Corporation (subsurface rights owned by Arctic Slope Regi.onal Corporation). Current, as well as proposed, Alpine Oilfields are owned by both CPAI and Anadarko Petroleum Corporation (Anadarko). However, CPAI owns a majority stake in the Alpine Oilfield and is solely responsible for its operation.

Oil production at Alpine Development Project (ADP) commenced with the flow of oil in November 2000. The ADP currently consists of two developments, CD-1 and CD-2, and an airstrip. When the ADP was originally planned and permitted, future oil and gas production were anticipated to be supplemented via satellite developments. Satellite developments would allow production of oil reservoirs that cannot be reached from the existing ADP infrastructure and that are too small to justify separate processing facilities.

<u>The Preferred Alternative</u>

The Preferred Alternative analyzed in the BA (Alternative F) comprises aspects of Alternatives A, B, C, D_1 and D_2 evaluated in the DEIS. The Preferred Alternative is similar to Alternative A with modifications made in the road routes to CD-4, CD-6, and CD-7, to power lines, to pipelines, and to bridges. Under the Preferred Alternative, a 44.2 km road and an 1179 m airstrip would provide access to the 5 production pads. Total gravel requirements would cover 101.6 ha, and the approximate length of new pipeline would be 59.7 km. Pipelines would be elevated on vertical support members (VSMs) to a minimum of 2.1 m above the tundra. No poles would be used for power lines under the proposed action. Utility lines would be mounted on VSMs adjacent to pipes, and would also maintain a minimum 2.1 m elevation. To minimize attracting and disorienting birds, artificial exterior lighting on all structures over 6.1 m tall would be designed to direct light inward toward the structures and downward, except as required by Federal safety regulations. All drill rigs, buildings, and other structures would have lighting designed in this manner. All communication towers will be located on production pads and will not have guy wires. For aircraft activity associated with the construction and operation of the project, BLM and CPAI have committed to modifying the schedule of construction to reduce aircraft activity during sensitive pre-nesting and nesting periods. The annual projection for summertime aircraft traffic during construction and drilling for the proposed action is 7,280 flights by summer 2010. In total, the Preferred Alternative will require approximately 18,240 summer flights over the life of the project (2005 to 2040). CPAI states that this estimate includes all flights resulting from drilling, construction, production, maintenance, research and associated tours/VIP visits.

Gravel for roads, pads, and the airstrip would be deposited during winter. Potential gravel sources for the project are the ASRC Mine Site and the Clover Potential Gravel Source. The ASRC Mine Site is approximately 10 km southeast of the proposed CD-4 facility, and surface area disturbance is covered by an existing permit and a submitted reclamation plan (Figure 1). The Clover Potential Gravel Source is approximately 10.4 km northwest of Nuiqsut, 13.6 km southwest of CD-2, and 14.0 km south of Harrison Bay coastline (Figure 1). The ASRC Mine Site is expected to be the primary source of material for CD-3 and CD-4, and the Clover site would be the primary source for CD-5, CD-6, and CD-7. Surface area of the Clover mine is projected to be 26.3 ha. On July 13, 2004 a draft mining and reclamation plan was submitted to the Service for the Clover Gravel Mine Site. The service has analyzed this draft mining plan and it is covered by this BO.

The pipelines connecting CD-3 to CD-1 would consist of a 3-phase production line, water line, miscible injection gas line, lean gas line, and products line. Similar pipelines would run between CD-4 and CD-1. Pipelines for CD-5, CD-6, and CD-7 would likely include a production line, MI pipeline, lean gas pipeline, and water line. Pipelines generally would follow a separate alignment 150-300 m from access roads, except at the major bridge crossings and road junctions. Pipelines would be supported on VSMs and would cross several drainages, including the 503 m wide Nigliq Channel. CPAI is currently selecting a pipeline bridge design that would be appropriate for drainage crossings. Three pipeline bridges would span channels between CD-1 and CD-3.

Roadless Development

The CD-3 production pad would be located between the West Ulamnigiaq and East Ulamnigiaq Channels of the Colville River (Figure 1). The CD-3 production pad would be situated at least 200 feet from surrounding water bodies. The CD-3 satellite would consist of a 5.1 ha production pad connected to an airstrip and apron/taxiway by a 0.6 km access road and a short gravel spur from the east end of the airstrip leading to a floating boat launch. The total gravel footprint of CD-3 would be 12.4 ha. No all-season road access to the site is planned. Most construction, including drilling, would take place in winter with access by ice road. The winter drilling season would span a minimum of 100 days and access by ice road would be available for another drilling rig for emergency relief. Drill rigs would be transported before break-up to other sites for use during summer months. Drilling of CD-3 under this schedule would take approximately 7 winter seasons to complete the development program (2005-2011). Well workovers and other drilling activities would require ice roads and would be conducted over portions of the lives of each facility. Summer construction at CD-3 would be limited to gravel conditioning, compaction, and grading in 2005 and 2006; construction and placement of tank containment and other on-pad facility support in 2005 and 2006; and pipeline hydrotesting in 2006. During the month of May, ~28 helicopter flights/week from Alpine to CD-3 would be required for gravel work in 2005-2006 and well and pipeline work in 2007-2012. No flights are anticipated to CD-3 during 1-15 June in 2005 and 2006, unless dewatering the pad is necessary, in which case no more than 4 flights/day would occur sometime during the first half of June. During gravel work in mid-June-July of 2005 and 2006, 28 helicopter flights/week from Alpine to CD-3 and 1-5 Otter or

CASA roundtrips/week from Deadhorse to Alpine would occur. In August, Flights to CD-3 could increase up to 84 flights/week to support more intensive gravel work and other construction activities. Once gravel surfaces harden enough for fixed wing aircraft, small airplanes will replace helicopters, and the number of flights in August would decline to 28/week because the airplanes can carry more payload. However, if gravel surfaces do not harden by 2006, it may be necessary to extend gravel work to summer 2007, under the same restricted schedule of activity. In total, CPAI estimates that 2816 flights will be required for CD-3's drilling and construction phases.

After construction and drilling are completed in 2006, the facility would be turned over to operations personnel for maintenance and operation activities. Although drilling is anticipated to be ongoing through 2011, it will remain a winter-only activity. Startup of the CD-3 facility is scheduled for late summer 2006, following pipeline hydrotesting. After startup, the operators based at CD-1 would access the CD-3 drill site with an average of 8 flights/week in the summer via small aircraft using the gravel airstrip. It is not anticipated that access will rely on helicopter usage after the summer of 2006, thus only small aircraft will be transporting crews to the site along established flight paths. During these trips, operators would perform scheduled maintenance as well as routine pad visits. Scheduled maintenance would include such activities as culvert thawing prior to breakup and management of surface water on gravel pads and in well houses, in accordance with regulatory requirements. Permanent housing would not be provided at CD-3, although an emergency shelter would be included in the facility. Spill prevention and response training would require some additional activities during the operation phase of the development. Weekly inspections from a twin Otter with forward looking infrared radar would be flown over pipelines, as required by State regulation. In total 10,800 flights are anticipated as a result of CD-3's production phase and 13,616 flights for all CD-3's phases (2816 + 10,800 = 13,616). In addition to this estimate of planned flights, CPAI maintains that unplanned events possibly could occur that would either constitute emergencies or immediate threats to personnel safety or the environment, or constitute pre-emergency situations that could develop into emergencies if not immediately addressed. Emergencies are not anticipated to occur frequently, however, emergencies have occurred elsewhere at drill sites on the North Slope. These emergencies may require additional unscheduled visits to CD-3.

Quarterly spill drills would be conducted on gravel pads throughout the ASDP Area. Drills involving equipment deployment in eider habitat would be coordinated with the Service to occur outside the period that eiders are sensitive in order to prevent unnecessary disturbance. Spill containment activities would require additional access by boats to channels near CD-3 during the ice-free period. Boating would be required for deploying, demobilizing, and maintaining boom on channels at 6-8 control points and accessing and maintain other pre-staged spill containment supplies along channels. These activities might require ~10 boat trips after breakup in June-July and ~10 more in August-October of each year of operation.

Roaded Developments

Four roaded satellite facilities are planned as part of the ASDP: CD-4, CD-5, CD-6 and CD-7. These satellites would require 44.3 km of gravel roads and they would be serviced and maintained by crews based out of CD-1.

CD-4 would be located west of the existing Alpine Sales Oil Pipeline corridor and east of the Nigliq Channel of the Colville River (Figure 1). The CD-4 satellite would include a 3.8 ha gravel production pad and a 6.1 km gravel road connected to CD-1. The road is diverted east around the lake L9323. CD-4 would require a total of 15.2 ha of gravel and a 7.2 km pipeline on new VSMs that would parallel the existing pipelines between Kuparuk to CD-1. Operation and maintenance personnel would be housed at CD-1. Drilling would take place over 2 summers (2006 and 2007).

CD-5 would be located approximately 6 miles south-southwest of CD-1 and west of the Nigliq Channel of the Colville River (Figure 1). The CD-5 satellite would include a 3.7 ha gravel pad and a 6.9 km gravel road to CD-2 for total gravel footprint of 15.0 ha. A 503 m bridge would span the Nechelik Channel of the Colville River so that no abutments are within the channel, and a 24 m bridge would cross a tributary channel for access to CD-5 and the remaining NPR-A pads under the proposed action. Drilling would take place over 2 winters (2010 and 2011) and 1 summer (2010).

CD-6 would be located approximately 15 miles southwest of CD-1. The CD-6 satellite would include a 3.7 ha gravel production pad connected to the proposed CD-5 satellite by a 21.2 km gravel road and a 107 m bridge across the Ublutuoch River. CD-6 would require placement of approximately 38.5 ha of gravel. Under the proposed action, CD-6 and portions of its access road are located within the Fish Creek setback. The placement of a road and well pad within the setback would require an exception to the restriction on permanent facilities in this zone. CPAI sent a letter to BLM requesting an exception to this stipulation on April 8, 2004. Drilling would take place over two winters (2008 and 2009) and one summer (2008).

CD-7 would be located approximately 20 miles southwest of CD-1. The CD-7 satellite would include construction of a 3.7 ha gravel production pad, which would be connected to the CD-6 satellite by a 10.1 km gravel road, which was shortened and straightened to avoid a tundra swan nest and a fox den site. The pad and road combine for a 20.5 ha gravel footprint. Drilling CD-7 would take approximately 1.5 years. Drilling would take place over two winters (2010 and 2011) and one summer (2010).

Major construction would occur during winter, with final gravel compaction and resurfacing occurring during the summer. To effectively prepare the gravel for operation, it will be necessary to work the gravel aggressively during at least the first 2 summer seasons following placement. Drilling would occur at CD-4, 5, 6 and 7 during summers and/or winters of 2006-2011. Manpower needs would peak in winter 2005-2006 and summer 2006. To support winter construction and drilling, varying amounts of ice road would be constructed annually.

Interrelated and Interdependent Actions

For this BO, the Service considered activities that would be interrelated and interdependent to the proposed action as well as accidental events that may occur as a result of the proposed action. Interrelated actions are those actions that are part of a larger action and depend on the larger action for their jurisdiction. Interdependent actions are those actions that have no independent utility apart from the action being considered in the BO. Interrelated and interdependent activities that may occur in or near the ASDP Area in conjunction with the proposed action include additional mineral exploration/development on Native lands, additional telecommunications infrastructure, increased research activity, offshore oil exploration/development, onshore support facilities, additional staging areas, access roads, and accidental oil spills originating from barges, tank farms, and supply trucks/vessels.

STATUS OF THE SPECIES

Spectacled eider

The spectacled eider was listed as a threatened species under the Act in May 1993. Currently, primary nesting grounds are the Yukon-Kuskokwim Delta, the North Slope (Cape Simpson to the Sagavanirktok River) of Alaska, and in the Chaun Gulf and the Kolyma, Indigirka, and Yana river deltas of arctic Russia. Post-breeding flocks of staging and molting spectacled eiders have been observed in Mechigmenan Bay (on the eastern coast of Russia's Chukotsk Peninsula), Alaska's Ledyard Bay (southwest of Point Lay), Peard Bay, Norton Sound, and 80 km south of Saint Lawrence Island. An estimated 7,149 spectacled eiders occupied the Arctic Coastal Plain of Alaska in June 2003 (Larned et al. 2003), about 2% of the estimated 375,000 world population (Larned and Tiplady 1999).

From late December to early April, the only known wintering area of spectacled eiders is within leads in the pack ice southwest of St. Lawrence Island in the Bering Sea (Larned et al. 1997, Petersen et al. 1999). Leads in ocean ice are important pathways for marine bird and mammal species migrating along the Beaufort Sea coast in Alaska and Canada. All species of eiders use this lead system, typically flying at altitudes less than 30 meters (Johnson and Richardson 1982). During spring migration spectacled eiders migrate offshore along the Bering Sea (median 15.3 km), Beaufort Sea (median 6.6 km for males, 16.6 km for females), and Chukchi Sea (median 34.9 km) coasts (P. Flint pers. comm.). Very little is known about migratory routes east of Barrow because the definitive lead system transforms into numerous branches varying in location and extent from year-to-year. Because few spectacled eiders are observed in marine areas along the Beaufort coast in spring, a majority may migrate to nesting areas overland from the Chukchi Sea (TERA 2003). Migration of eiders (the majority of which are king and common eiders) along Alaska's northern coast has been described in several studies (Thompson and Person 1963, Johnson 1971, Woodby and Divoky 1982). Spectacled eiders are observed in mixed flocks of king, common, and sometimes Steller's eiders, but the proportion of spectacled eiders is quite small. Although information specific to spectacled eider flight behavior is lacking, a spectacled eider was seen

striking a utility wire near an electric light in white-out conditions on St. Lawrence Island in 1998 (Service, unpublished). In summer 2003, 4 dead/injured spectacled eiders were retrieved by the Service that likely collided with overhead power lines/guy wires (3 at Barrow and 1 at Prudhoe Bay) (Service, unpublished). In summer 2004, 2 dead/injured spectacled eiders were retrieved at Barrow by the Service that likely collided with overhead power lines/guy wires.

Spectacled eiders arrive on North Slope breeding grounds paired, often in small flocks, in late May to early June. Spectacled eiders nest mainly from the Sagavanirktok River to the Chukchi Sea, and only sparsely to the east (Larned et al. 2001a). Based on Service aerial surveys (1998-2002, Arctic Coastal Plain east to the Arctic National Wildlife Refuge), the highest densities were found south of Barrow, with smaller areas of concentration east of Teshekpuk Lake, on the Colville River Delta, and near western Simpson Lagoon. Overall density was estimated to be 0.23 birds per square kilometer on the North Slope in 2003 (Larned et al. 2004).

Male spectacled eiders begin to depart breeding areas during incubation, which is during late June on the North Slope. On the North Slope, pair numbers peak in mid-June and the number of males declines 4-5 days later (Smith et al. 1994, Anderson and Cooper 1994, Anderson et al. 1995). Following their late June departure from the nesting areas, males apparently make little use of the Beaufort before migrating to the Chukchi Sea. During late June the Beaufort Sea has little open water, hence males present at breeding grounds east of Barrow normally do not use marine habitats and fly directly overland (most heading to a molting/staging area in Ledyard Bay) (TERA 2003). Later in the season (late June through September), when females depart the North Slope, much more of the nearshore zone is ice-free. Open water in marine habitat allows for extensive use of the western Beaufort Sea. Radio telemetry studies have shown that most female spectacled eiders that migrate west toward Barrow use the nearshore zone of the Beaufort Sea as they transit to their molting/staging areas. In 2000,13 female spectacled eiders tracked via radio telemetry primarily used the western Beaufort (71% of all bird-days) while areas near Stockton Island were also extensively used (17% of all bird-days) (TERA 2003). The females remained in the Beaufort Sea nearshore zone for an average of about two weeks (range 6-30 days).

Predators of spectacled eider eggs include gulls, jaegers, and foxes. In arctic Russia, apparent nest success has been calculated to be as low as <2% in 1994 and 27% in 1995; foxes, gulls, and jaegers are suspected to have depredated most of the nests (Pearce et al. 1998). On Kigigak Island in the Yukon-Kuskokwim Delta, nest success ranged from 20-95% in 1991-1995 (Harwood and Moran 1993, Moran and Harwood 1994, Moran 1995, Moran 1996). Nest success may have been higher in 1992 than in other years of observation, because foxes were eliminated from the island prior to the nesting season that year. Apparent nest success in 1991 and 1993-1995 in the Kuparuk and Prudhoe Bay oil fields on the North Slope ranged from 25-40%(Warnock and Troy 1992, Anderson et al. 1998).

Spectacled eider incubation lasts 20-25 days (Dau 1974, Kondratev and Zadorina 1992, Harwood and Moran 1993, Moran and Harwood 1994, Moran 1995). Average clutch sizes

on the North Slope average 3.2-3.8, with clutches up to 8 reported (Quakenbush et al. 1995, Troy pers. comm.). Hatching on the North Slope occurs from mid- to late July (Warnock and Troy 1992). Fledging occurs approximately 50 days after hatching. At this time, females with broods move directly from freshwater to marine habitats (Dau 1974, Kistchinski and Flint 1974).

On the nesting grounds, spectacled eiders feed by dabbling in shallow freshwater or brackish ponds, or on flooded tundra (Dau 1974, Kistchinski and Flint 1974). Food items include mollusks, insect larvae such as Tipulidae (craneflies), trichopterans (caddisflies), and chironomids (midges); small, freshwater crustaceans, and plants or seeds (Cottam 1939, Dau 1974, Kistchinski and Flint 1974, Kondratev and Zadorina 1992). Spectacled eiders in the marine environment feed predominately on clams and small amounts of snails, amphipods, and other bivalves. In March-April 1999 and 2001, studies within the spectacled eider wintering areas showed that the esophagi of collected eiders contained only clams, almost entirely *Nuculana radiata* with no trace of the once dominant and preferred *Macoma calcarea* (Lovvorn 2002). Changes in the density of *Macoma calcarea* in the Bering Sea are coincident with an oceanic regime shift to warmer conditions in 1976-77 (Lovvorn et al. 2003). Exceptional climate change in the arctic and subarctic, and associated changes in marine communities and ice dynamics in spring, may have had important impacts on spectacled eiders.

The range-wide population of spectacled eiders is estimated at 375,000 (Larned and Tiplady 1999). From the early 1970s to the early 1990s, numbers of pairs on the Y-K Delta declined by 96% from 48,000 to 2,000, apparently stabilizing at that low level (Stehn et al. 1993, Petersen et al. 1999). This dramatic decline on the Y-K Delta was the primary reason the species was listed as threatened in 1993. On the North Slope, however, trends in population size are much less clear. Abundance indices from North Slope eider surveys in 1993-2003 do not show a statistically significant trend (Larned et al. 2001b, Larned et al. 2003), and data from prior to 1993 are not suitable for trend analysis.

Factors known or suspected to affect survival of spectacled eiders have been identified but the relative importance of these factors to the species' decline and recovery are not known. The extent and causes of population decline are difficult to assess because historical data are lacking for many locations. Several of the following factors are known to affect survival during the nesting season, but it is not clear whether they contributed to the decline of the spectacled eider population.

Lead poisoning is a confirmed cause of mortality of eiders that ingested lead shot on the breeding grounds in the Yukon-Kuskokwim Delta. Spent shot pellets are eaten, either as grit or by eiders foraging in sediments for food. The grinding action of the eider's gizzard, in combination with the acidic environment of its digestive tract, causes toxic lead salts to be released into the body. The proportion of spectacled eiders on the Y-K Delta's lower Kashunuk River drainage that contained lead shot in their gizzards is high (11.6%, n=112) compared to other waterfowl in the lower 48 states from 1938-1954 (8.7%, n=5088) and from 1977-1979 (8.0%, n=12,880). The lead exposure rate in spectacled eiders (based on X-

rays) is likely biased low (Flint et al. 1997), because lead is retained in the gizzard for only about three weeks (Elder 1954, Dieter and Finley 1978, Anderson and Havera 1986, Franson 1986, Anderson et al. 1987). Blood analyses of spectacled eiders indicate elevated levels of lead in 13% of pre-nesting females, 25.3% of females during hatch, and 35.8% during brood rearing. Nine of 43 spectacled eider broods (20.9%) contained one or more ducklings exposed to lead by 30 days after hatch (Flint et al. 1997). Spent lead shot in the lower Kashunuk River area and on Kigigak Island is causing additive mortality in spectacled eiders, that is, mortality over and above that caused by natural circumstances (Grand et al. 2003). It is possible that exposure to lead occurs in small, localized hunting areas on the North Slope as well, however, there are no site-specific data on lead contamination in this region.

Predation pressure on spectacled eider eggs, young, and adults may have increased in recent decades. Predators include arctic foxes (*Alopex lagopus*), red foxes (*Vulpes fulva*), large gulls (*Larus* spp.), jaegers (*Stercorarius* spp.), and snowy owls (*Nyctea scandiaca*). Native elders on the North Slope believe that fox numbers have increased in recent decades as a result of reduced trapping. Wastes made available from the commercial fishing industry in the Bering Sea and North Pacific, along with an increase in the garbage generated by coastal communities, have increased the year-round food supply for gulls. Glaucous gull populations could have increased in response to an increased food supply. However, a recent analysis of three aerial survey data sets revealed no clear evidence of an increase in North Slope gull numbers since the 1970's, although an increase of less than 100 percent would not have been detectable using this analysis (L. Noel, Entrix, pers. comm.).

Subsistence harvest of spectacled eider eggs and adults is another potential factor in the decline of the spectacled eider population. Alaska Natives have traditionally harvested eiders and their eggs in coastal villages during spring and fall. Subsistence harvest surveys for the North Slope indicate that an average of 155 spectacled eiders were taken at Wainwright during1988-1989 and only 2 spectacled eiders were reported taken at Barrow during 1987-1990 (Braund et al. 1993). Yup'ik Eskimos on the Y-K Delta have traditionally harvested spectacled eiders for subsistence purposes (Klein 1966). Although the human population on the Y-K Delta has grown substantially, changes in the numbers of active hunters are unknown. Similarly, available harvest technologies have become increasingly efficient, but the actual effects of new technologies on harvest levels are unknown. The estimated harvest of spectacled eiders on the Y-K Delta from 1992-95 averaged 272 birds/year (Service, unpublished); the 1992-2001 average is 123 birds/year (Service, unpublished).

There are other sources of take such as avicultural egg collecting (until 1991), disturbance from research activity, and loss of habitat in growing communities and oilfields. Their overall impacts to the spectacled eider population is unknown.

Other potential factors that may affect spectacled eider survival have been suggested but not investigated. These include changes in the invertebrate community structure in their winter habitats, bioaccumulation of contaminants in the marine environment, human harvest for sport and subsistence outside their breeding grounds, disease, parasites, and accidental strikes and/or disturbance of benthic feeding areas by commercial fishing activity.

In 1996, a Recovery Plan was finalized by the Service that provided strategies to recover the Alaska-breeding spectacled eiders to the point that protection under the Act is no longer required (i.e., "delisting" is appropriate). Objectives identified were: 1) prevent further declines of the Alaska-breeding population (including both the northern and western Alaska subpopulations); 2) determine size, trends, and distribution of the northern and western Alaska-breeding subpopulations; 3) investigate population dynamics by conducting population viability analysis (PVA); 4) determine if population declines and/or reproductive failures result from accumulation of environmental contaminants; 5) investigate the habitats used and prey items selected by foraging spectacled eiders away from breeding grounds; 6) assess the contribution of subsistence harvest to population trends; 7) investigate whether predator-prey relationships can account for population declines; 8) determine genetic profile of 3 major populations; and 9) collect data on the impacts of diseases and parasites.

On January 10, 2001, the Service designated 38,991 mi^2 of critical habitat for spectacled eiders at molting areas in Norton Sound and Ledyard Bay, breeding areas in central and southern Yukon-Kuskokwim Delta, and wintering area in waters south of St. Lawrence Island. Although the Service believes some portion of the North Slope is essential for the conservation of the species and therefore meets the definition of critical habitat, we did not designate critical habitat on the North Slope. The Act provides that an area essential to the conservation of listed species can be excluded from critical habitat designation if the benefits of excluding the area outweigh the benefits of designating the area as critical habitat, provided that exclusion does not result in the extinction of the species.

ENVIRONMENTAL BASELINE

Regulations implementing the ESA (50 CFR §402.2) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the ASDP Area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Status of Spectacled eiders within the ASDP Area

The area between Teshekpuk Lake and the Colville River Delta is nesting habitat to over 10% of spectacled eiders on the North Slope (Service, unpublished). Annual aerial surveys conducted by the Service indicate that up to 5.4 % of North Slope breeding spectacled eiders make use of areas in/adjacent to the ASDP Area. In summer, spectacled eiders are widely distributed near lakes or coastal margins throughout much of the ASDP Area with a trend toward higher abundance towards the coast and northeast towards the Colville River Delta. Spectacled eiders are essentially absent from the Area from October to May (Larned et al. 2001). No trend is discernible in the spectacled eider population size Slope-wide (Quakenbush et al. 2002). Furthermore, the factors that limit abundance on the North Slope have not been identified. Therefore, it is difficult to determine whether human activity and

habitat alteration have affected the status of the species in the project area. However, factors that may have affected the status of the species in the project area include loss of breeding habitat, disturbance from oilfield operations, research efforts, ingestion of lead shot, increases in predator populations, and subsistence harvest.

Factors affecting species environment within the ASDP Area

Breeding habitat on the North Slope has remained largely unaltered and uninhabited by humans. A small portion of the spectacled eider's potential breeding range has been altered by oil and gas exploration/development. CPAI currently operates the only oil/gas production wells within the Colville River Delta (Alpine: CD-1 and CD-2). Both these pads are located in the southern portion of the Delta where spectacled eider densities are considered to be relatively low compared to and they are especially low compared to portions of the northern Delta near CD-3. Therefore, the informal section 7 consultation done for these facilities in 1998 determined that the project was not likely to adversely impact spectacled eiders.

In 1964 and 1965 the State of Alaska held oil and gas lease sales for State lands between the Colville River and the Canning River. These lease sales led to the 1968 discovery of the Prudhoe Bay Oilfields. Currently Prudhoe Bay's developed area now encompasses over 350 square miles. Within the last decade oil and gas exploration/development has spread out from the ACP near Prudhoe Bay north to offshore platforms in the Beaufort Sea, east to the borders of the Arctic National Wildlife Refuge and west to Teshekpuk Lake.

To date, no oil and gas developments have been constructed on Federal lands within NPR-A. However, oil and gas exploration has been ongoing within NPR-A since 1923. The U.S. Navy did seismic work and exploratory drilling within NPR-A for oil and gas from 1923 to 1973. BLM held the first oil and gas lease sales within the NE NPR-A in 1983 and 1984. Those leases were superseded in 1998 by a new IAP/EIS that made 4 million acres of NE NPR-A available for oil and gas leasing. In 2002 BLM began planning for a revised IAP/EIS for NW NPR-A. In October 2003, BLM announced plans to reopen NE NPR-A IAP/EIS and reissue it in a format similar to the IAP/EIS for the NW NPR-A. In June 2004, BLM held an oil and gas lease sale in NW NPR-A under a new EIS that superseded the 1983 EIS for that area. With the recent economic discoveries of oil in NE NPR-A and the impending development there, lands to the west in the NW NPR-A have become of greater interest for oil and gas exploration. As NW NPR-A is explored and developed it is expected that additional infrastructure such as pipelines, staging areas, processing facilities and landfills will be required in NE NPR-A to support oilfield activities. Impacts of oil and gas activity in the ASDP Area include disturbance, accidental spills of toxic materials, potential new roads, off-road vehicle use, wetland filling, increases in predator populations and indirect effects of human presence in areas previously uninhabited.

Human population growth in the vicinity of Nuiqsut has also resulted in localized habitat loss due to construction activities and off-road vehicle use. On-road and off-road vehicle traffic are potential sources of disturbance. Spectacled eider research conducted at Alpine by CPAI

is also a source of disturbance, because those activities are oriented toward locating nests and broods. A Steller's eider nest was depredated at Barrow in 2000 likely resulted from nest-search disturbance, when the nest was left exposed to a jaeger because of the proximity of the researcher (Obritschkewitsch et al. 2001). Investigator disturbance studies on spectacled eider nests on the Yukon-Kuskokwim Delta found that routine visitation to nests resulted in an 0.08% additional loss of egg production from 1994-2002 (Bowman and Stehn 2003). Nest abandonment, in the absence of predation, has been documented after research-related trapping and handling of an incubating hen; it is possible that other forms of human disturbance near a nest could cause abandonment.

Global warming appears to be influencing widespread alterations in the Bering Sea's food web. Although spectacled eider population trends in Siberia, and on the North Slope before 1993, are unknown, the decline of spectacled eiders on the Y-K Delta appears roughly concurrent with long-term trends in the Bering Sea benthos (Lovorn et al. 2003). Studies begun in the mid-1980's have shown declines in the biomass per square meter and mean sizes of clams that are the spectacled eider's primary forage during the winter (Grebmeier and Dunton 2000). These observations have raised questions about effects of benthic changes on the winter diet of spectacled eiders and their late-winter body condition because for common eiders (*S. mollissima*) many females do not nest in years when feeding conditions on wintering areas are depressed (Coulson 1984).

Over the last decade strides in the affordability of wind turbine and cellular phone technology have led to explosive growth in the numbers of towers within the spectacled eider's migration corridor and breeding grounds. Migrating spectacled eiders are at risk of collision with objects in their path, such as towers, particularly when visibility is impaired during darkness or inclement weather, such as rain, drizzle, or fog (Weir 1976). The incidence of bird strikes appears to rise when objects are illuminated with constant diffuse light, and the tendency for birds to be drawn to diffuse light appears to increase during rainy or foggy weather. Its been reported that 88% of eiders flew below an estimated altitude of 10 m (32 ft) and well over half flew below 5 m (16 ft) (Johnson and Richardson 1982). Although information specific to listed eider flight behavior is lacking, a spectacled eider was seen striking a utility wire near an electric light in white-out conditions on St. Lawrence Island in 1998 (Service, unpublished). Accidental strikes of unidentified eiders in Northwest Alaska have been reported in association with the Bering Sea crab fishery and guyed towers in Nome, presumably influenced by bright lights (Service, unpublished). In summer 2003, 4 dead/injured spectacled eiders were retrieved by the Service that likely collided with overhead power lines/guy wires (3 at Barrow and 1 at Prudhoe Bay) (Service, unpublished). In summer 2004, the Service retrieved 2 dead/injured spectacled eiders at Barrow that likely collided with overhead power lines/guy wires (Service, unpublished).

Lead or other sources of contamination of habitat or prey species are possible in localized areas within the Northwest migration corridor of spectacled eiders. Spectacled eiders may swallow lead shot pellets when they probe the bottom for food, mistaking them for food items such as mollusks (small snails or clams) and insects or grit. While on breeding grounds, spectacled eiders typically dig in the bottom of lakes and ponds for their food and

are therefore at great risk for lead contamination. Although ingestion of lead is thought to take place primarily on the breeding grounds, exposure in marine molting, stopover and wintering areas has not been definitively excluded. Exposure of waterfowl to lead has been documented in the range of spectacled eiders. Elevated blood and tissue lead levels, morbidity, and mortality from lead poisoning were found in spectacled and common eiders (*Somateria fischeri* and *S. mollissima*, respectively) on the Yukon-Kuskokwim Delta (Franson et al. 1995, Flint et al. 1997, Flint and Herzog 1999). On breeding grounds near Barrow, one Steller's eider found dead in June had liver and kidney lead concentrations suggestive of lead poisoning, although several other Steller's eiders examined at the same time of year had lower lead tissue concentrations (Trust et al. 1997, Service, unpublished). Blood samples from nesting hens trapped near Barrow in 1999 and 2000 showed that all (8 of 8) had concentrations exceeding the clinical threshold for lead exposure and 7 of 8 exceeded thresholds for lead poisoning in waterfowl.

Often, with increases in human presence, there is a concomitant increase in nest predator populations such as gulls, ravens, and foxes. Residents of Barrow and other North Slope communities have observed an increase in populations of gulls and arctic foxes. Increased densities of arctic foxes and glaucous gulls associated with human development, particularly landfills, have also been noted at Barrow, Nuiqsut and Prudhoe Bay and common ravens have expanded their breeding range into these areas as well. Common ravens readily use oilfield infrastructure for nesting on the ACP. Ravens currently nest at Alpine (CD-1 and CD-2) and have even begun nesting at Northstar Island in the Beaufort Sea. There is very little information on predation of spectacled eider nests throughout most of the species' range in Alaska. Near Barrow, however, Steller's eider nest success in recent years has been very poor. Of 186 nests found from 1991-2000, only 15-18% survived until hatching, with predation thought to be the primary factor causing nest failures (Quakenbush et al. 1995, Obritschkewitsch et al. 2001). In addition to causing nest failures, predators at Barrow further reduced productivity through partial predation (where some but not all eggs in a nest were eaten) and by killing ducklings that survived the incubation period (Quakenbush et al. in prep.). Studies of nest predation in other areas have reported mixed results. For example, apparent nest success on the Indigirka River Delta, Russia in 1971 was 10-15%, and eiders nesting near gull nests had higher nesting success (Kistchinski and Flint 1974, Mayfield 1975). However, in 1994 nest success was <2% and nest predators such as arctic foxes, glaucous and herring gulls, and parasitic and pomarine jaegers are suspected to have depredated most of the nests (Pearce et al. 1998). Also, nearly complete predation of spectacled eider nests by jaegers and foxes was recorded on the Chaun River Delta, Russia after a June snow storm (Kondratev and Zadorina 1992). Predation by gulls, jaegers, and arctic foxes probably affects the survival of spectacled eider eggs and ducklings throughout the species' range.

Sport hunting for spectacled eiders was closed in 1991 by Alaska State regulations and Service policy. Outreach efforts have been conducted by the Service to inform hunters of these closures. In 2003, a spring subsistence hunting season for migratory birds in Alaska was proposed. Although, killing listed eiders is not permitted by the spring hunting regulations, many hunters cannot identify birds on the wing and will likely mistake their

quarry killing prohibited species. An ESA consultation for this spring subsistence hunt was completed in May 2003 and adverse impacts identified in the BO are considered here and will be considered in future consultations concerning listed eiders in Alaska. Accurate information on current harvest rates is not available, but hunter surveys and other observations indicate that both intentional and unintentional shooting of spectacled eiders likely continues in Northwest Alaska (Paige et al. 1996, Georgette 2000, Wentworth 2001).

Research efforts related and unrelated to listed eiders also may result in impacts within the ASDP Area. Research activity that occurs in the ASDP Area that is unrelated to the proposed action includes the Service's aerial surveys for waterfowl. Examples of research activity that occurs in the ASDP Area that is related to the proposed action includes spectacled eider nest searches, aerial waterfowl surveys, various hydrology studies, freshwater fish surveys, geomorphology studies and archeology surveys. Equipment noise, aircraft operations (mostly helicopters landing on tundra), pedestrian traffic and other activities associated with research may disturb nesting spectacled eiders near the ASDP facilities. Field research within NE NPR-A and the Colville River Delta typically occurs during the summer months, but numbers, locations, and type of activities remain speculative because data has not been collected by BLM that quantifies these activities. Through section 7 processes, the Service will continue providing project applicants with recommendations and restrictions intended to minimize impacts of associated research on spectacled eiders. These include timing restrictions and buffers around known nest sites that will likely benefit spectacled eiders at the individual level. Estimating impacts from field research is difficult because despite section 7 requirements that field researchers consult with the Service, many researchers are unaware of the requirement and hence never consult. Our experience tells us that individual research projects typically don't have impacts that result in take. However, without a greater understanding of the extent of research activities within NE NPR-A and the ASDP Area, it is difficult to determine whether the cumulative effects of field research may result in take.

All of the factors discussed here may have influenced populations of threatened spectacled in northern Alaska, although it is unknown if these factors played a major role in the species' decline. The amount of take of spectacled eiders that may result from this proposed action is identified within the Incidental Take section of this BO and falls within the limits identified in the 1998 BO for the NE NPR-A IAP/EIS. Therefore the 1998 BO for the NE NPR-A IAP/EIS is still valid.

EFFECTS OF THE ACTION ON LISTED SPECIES

This section includes an analysis of the direct and indirect effects of the proposed action on spectacled eiders and/or critical habitat and its interrelated and interdependent activities. The spectacled eider densities used for the following analysis on CD-3, 5, 6 and 7 were derived from a multi-year aerial survey data set (1993-2002) collected by the Service designed specifically to detect pre-nesting waterfowl across the ACP (0.58 birds/km^2 for CD-3 and 0.04 birds/km^2 for CD-5, 6 and 7). The spectacled eider densities for CD-4 were derived

from aerial surveys conducted over the ASDP Area by CPAI from 1993-2002 (0.01 birds/km^2). We note that density values observed throughout the varied considerably among years. We chose to use the mean density from all years of data to correct for this variability. These assumed densities, however, do not compensate for the bias inherent in estimating bird densities form the air. An established/accepted correction factor is not currently available to convert the numbers observed from the air to the actual number of birds present, compensating for those birds that are not detected from the aircraft. Without such a correction factor, we acknowledge that the aerial survey data used throughout this BO tend to underestimate eider density, biasing our estimate of effects downward.

Oilfield Disturbance

It is likely that disturbance in oilfields can adversely affect spectacled eiders during nesting, but these effects are usually assumed to be minimal in magnitude. Few quantitative estimates of the extent of adverse impacts of oilfield activity to nesting waterfowl exist for tundra environments. The few studies that have been done deal specifically with investigator disturbance. Several studies demonstrate negative effects of investigator disturbance on waterfowl nesting success. Infrequently, waterfowl will permanently abandon nests after they are disturbed. On the YKD, investigators estimated that nest trapping resulted in a loss of 5% of cackler goose eggs due to desertion (Mickelson 1975). A single search of study plots for an investigator disturbance study done for spectacled eiders on the YKD caused the loss of 0.08% of egg production (Bowman and Stehn 2003). Gulls were attracted to, and more nests were destroyed at, eider nesting islands after human disturbance (Ahlund and Gotmark 1989). However, in 1997 investigators marked and visited spectacled eider nests at varying schedules and found no difference in survival rates due to observer impact (Grand and Flint 1997).

Spectacled eider behavior appears to change with changing environmental conditions. At times, they have been observed foraging near human-made structures such as the Deadhorse Airport and Oliktok Long Range Radar Site (Service, unpublished and USAF, unpublished). However, we have observed that they tend to move and maintain a distance of at least 100 meters from humans and operating vessels. As such, we do not anticipate total abandonment of areas due to investigator/oilfield activity, but anticipate some level of disturbance due to the presence of investigators/oilfield workers.

Potential avenues of disturbance associated with the proposed action include oilfield construction, oil spill response training, production activity, pipeline maintenance, staging area activity, infield roads, increased aircraft traffic, watercraft support, and gravel mining/transport. Disturbance resulting from production activity, infield roads, and oil spill response training is expected to be constant/chronic and result in driving spectacled eiders out of habitats within a zone of influence around infrastructure. Therefore, these avenues of disturbance are addressed in the Habitat Loss subsection of this Effects of the Action section. Also, because BLM assumes that oilfield construction, pipeline maintenance and gravel mining/transport will only occur during the winter months when spectacled eiders are not present on the ACP, we do not believe these activities will disturb spectacled eiders.

Therefore, this subsection only addresses adverse impacts to spectacled eiders resulting from aircraft traffic and watercraft support.

Disturbance from aircraft traffic and watercraft support activity could adversely impact spectacled eiders by: 1) displacing adults and/or broods from preferred habitats during pre-nesting, nesting, brood rearing and migration; 2) displacing females from nests, exposing eggs or small young to inclement weather or predators; and 3) reducing foraging efficiency and feeding time. The behavioral response of nesting spectacled eiders to disturbance is unknown, but general observations in the Kuparuk Oilfield indicate that spectacled eiders respond similarly to other waterfowl (ABR, unpublished). Some spectacled eiders have been seen nesting near the Deadhorse and Barrow Airports. This indicates that some individuals may tolerate or become habituated to frequent aircraft noise. However, tolerance likely varies among individuals, and the consistent nature of aircraft using airports may lend itself more readily to habituation by spectacled eiders than the varied disturbances resulting from oilfield activities. Therefore, some birds may be displaced with unknown physiological and reproductive consequences.

1. Aircraft Overflights

Aircraft would primarily be used to support winter oil development, production and abandonment activities in the ASDP Area. Wintertime aircraft flights associated with oil activities should have no effects on listed eiders. Nesting spectacled eiders could be disturbed by summer aircraft overflights in support of development, production and abandonment activities. However, instances of disturbance to nesting spectacled eiders is expected to be rare due to their extremely low densities across most of the ASDP Area. In the vicinity of CD-4, 5, 6 and 7, spectacled eider breeding season density is ≤ 0.04 birds/km^2 (Larned et al. 2002a). However, in the vicinity of CD-3, spectacled eider breeding season density is approximately 0.58 birds/km^2 (Service, unpublished). Therefore, adverse impacts to nesting spectacled eiders from aircraft activity in the vicinity of CD-3 are possible.

The number of aircraft trips to be flown in summer support of the ASDP over its lifetime totals 18,240. Since CD-3 is the only proposed roadless development, the majority of the estimated flights will be in the form of roundtrips from CD-1 to CD-3 (7,156). During May of 2005 through 2012, 28 flights/week from CD-1 to CD-3 would be required for gravel, well and pipeline work. No flights are anticipated to CD-3 from June 1 to June 15 in 2005 and 2006 unless dewatering the pad becomes necessary. In that case, no more than 12 flights would occur during the first half of June. During gravel work in mid-June-July of 2005 and 2006, 28 helicopter flights/week from CD-1 to CD-3 and 10 fixed-wing flights from Deadhorse to CD-1 would occur. In August, flights to CD-3 could increase up to 84 flights/week for more intensive gravel work and other construction activities. Once the gravel surface hardens enough for fixed wing aircraft in 2006, fixed-wing aircraft will replace helicopters, and the number of flights would decline to 28 per week. After production

begins, operators based at CD-1 in the summer would access the CD-3 drill site with an average of 8 flights/week. Weekly inspections from fixed-wing aircraft would also be flown over pipelines. CPAI does not anticipate that access will rely on helicopter usage after the summer of 2006, thus only small aircraft will be transporting crews to the CD-3 along established flight paths.

In addition to aircraft flights to support oil activities, the BA assumes that facility tour (VIP) and research related flights would occur under the Preferred Alternative. Although not mentioned specifically in the DEIS, BLM's BA states that their estimates of flights resulting from the proposed action includes flights that would be associated with activities not associated with construction, drilling and operations such as flights for VIP tours and research. However, BLM goes on to say that their flight estimates reflect the best available information on total expected flights and that the degree of uncertainty, expected variability among activities, and lack of available historical data from other projects makes it speculative to parse flights estimates according to activity types. BLM also assumes that reasonably foreseeable future air traffic associated with research and facility tours would be few in number, sporadic in occurrence, of limited duration, and will not exceed the levels currently estimated for the project as a whole.

Summer aircraft traffic could adversely impact threatened eiders by: 1) displacing adults and/or broods from preferred habitats during pre-nesting, nesting, brood rearing and migration; 2) displacing females from nests, fragmenting broods and exposing eggs or small young to inclement weather or predators; and 3) reducing foraging efficiency and feeding time. The behavioral response of eiders to aircraft overflights is largely unknown. Some spectacled eiders nest and rear broods near the Deadhorse Airport, indicating that some individuals may tolerate frequent aircraft noise. However, individual tolerances are likely to vary and the intensity of disturbance associated with the proposed action would, in some cases, be greater than that experienced by birds near the airport. Some birds may be displaced with unknown physiological and reproductive consequences. Also, the number of eiders that would be exposed to aircraft overflights is variable. This is, in part, because the potential flight paths to drilling sites within the ASDP Area could range from short (e.g., a direct route from CD-1 to CD-3) to lengthy (e.g., a helicopter flight path from Deadhorse to tundra areas west of CD-7). Because CD-3 is the only roadless development within the ASDP, spectacled eiders between CD-1 and CD-3 are much more likely to be overflown than those in the vicinity of the other proposed developments.

In conclusion, BLM states that the majority of aircraft flights associated with the proposed action will occur from CD-1 to CD-3. Disturbance from these flights may result in decreased feeding and resting, reduced incubation, flushing of nesting or brood-rearing females, or displacement from preferred habitats. However, in the ASDP BA CPAI committed to minimizing aircraft activity during the sensitive pre-nesting and nesting periods. CPAI has also agreed to develop a flight plan requiring

pilots to use the shortest flight path possible from CD-1 to CD-3 in order to minimize the number of nesting spectacled eiders overflown and establish a consistent zone of aircraft disturbance that will allow birds to habituate to flights or evacuate the zone of disturbance. Therefore, while aircraft overflights potentially could cause adverse effects to individual spectacled eiders, their low nesting densities (0.58 birds/km^2 near CD-3) combined with the number of summer flights anticipated during the pre-nesting/nesting period suggest that few individuals would be impacted. For these reasons, we do not believe that aircraft disturbance will cause population-level effects.

2. *Watercraft Support*

Disturbance to spectacled eiders from watercraft support emanating to/from CD-3 is possible. Under the Preferred Alternative, nonrecreational jetboats and airboats would be allowed on all waters that are seasonally accessible from CD-3. Quarterly spill drills would be conducted from CD-3's gravel pad and dock facilities. Spill containment activities would require access by boats to channels near CD-3 during the ice-free period. Boats would be required for deploying, demobilizing, and maintaining boom on channels at control points and accessing and maintaining other pre-staged spill-containment supplies along channels. Boats may also enter nearshore waters of the Beaufort Sea to train for the unlikely event that spilled oil could quickly flow down river and escape the Colville River.

The amount of disturbance resulting from vessel traffic would likely last throughout the open-water season and would depend on trip frequency. Oil spill response vessels are likely to follow established routes, so the actual area with disturbance would be limited. Spectacled eiders that are accompanying young, staging or migrating in coastal or offshore waters during the staging/migration periods (late June/early July; late August/September), could encounter vessels associated with oil spill response activities in the ASDP Area. Spectacled eiders and broods would typically avoid such encounters by flying away. The level of disturbance anticipated will be variable depending on the extent, type and routes taken. However, for watercraft activity in the Beaufort Sea, because of the vast amount of available, staging habitat spectacled eiders would likely be able move to areas of low activity. Hence, impacts to listed eiders from watercraft activity in the Beaufort Sea are expected to be minimal.

Extensive nearshore and offshore aerial surveys in the Beaufort Sea in 1999 and 2000 detected two flocks of spectacled eiders (numbering 40 and 100) offshore in the Harrison Bay area (Fischer at al. 2002). Satellite telemetry work done on spectacled eiders in the Prudhoe Bay oilfields during 2000 and 2001 showed that Smith Bay was an important marine area for females and Gwydyr Bay for males (TERA 2003). Vessels traveling between CD-3 and the Beaufort Sea will not likely traverse either of these bodies of water.

If watercraft activity occurs between October and May, the probability of encounters with spectacled eider would be low. This probability increases, however, if the action occurs between May and October because of the presence of spectacled eiders migrating across the Chukchi and Beaufort seas to reach breeding grounds in the spring and when migrating to molting/staging areas in the summer and fall. Nonetheless, given the low density of spectacled eiders in the ACP's riverine and marine environments, we assume that few spectacled eiders would encounter vessel traffic. Although numbers of birds displaced could be substantial depending upon the season of occurrence (tens or hundreds of individuals, particularly during fall migration), alternate foraging and staging habitat would be available away from probable routes. We believe that eiders would avoid such encounters by flying away, that the frequency of those disturbances will not reach the threshold that would impair survival, and that alternative suitable habitat is available. In addition, CPAI and BLM have committed to coordinating with the Service to schedule oil spill response exercises to occur outside the period that spectacled eiders are sensitive in order to prevent unnecessary disturbance. Under these conditions, take is unlikely, and impacts would not result in population-level effects.

In conclusion, the proposed oilfield activities may adversely affect individual listed eiders. However, their low nesting densities combined with, the limited amount of proposed oilfield infrastructure/activity and BLM's willingness to schedule activities outside the nesting season suggests that few individuals would likely be adversely impacted.

Habitat Loss

Construction, production and mining activities may result in disturbance and altered habitat effects on behavior, distribution, and abundance of spectacled eiders in or adjacent to the ASDP Area. Depending on location and season, oilfield activities in areas where spectacled eiders occur could render habitats unusable due to disturbance or filling/coverage from construction activities, gravel mining, pads, and roads, facilities, and drilling activities.

Winter exploration activities and summer storage of drill rigs on ice pads (5-6 acres) may alter habitats temporarily (e.g., compression of standing-dead vegetation, or delayed phenology of vegetation due to late ice melt). This activity could affect the distribution of eiders occurring in or adjacent to the ASDP Area in subsequent summer seasons. The magnitude of these impacts depend on a variety of factors including habitat type, volume of ground ice, and local hydrology (Walker et al., 1987). Only a small portion of the tundra within the ASDP Area would be affected during any particular year, particularly of the wetter habitats that spectacled eiders frequent.

BLM's Preferred Alternative authorizes 5 production pads, 1 airstrip, 1 boat launch, 45 km of roads, 1 pump station and 60 km of oil pipeline are likely to be developed. Listed eiders could be affected by disturbance, though most incidents are expected to result in minor effects. However, the impacts of repeated disturbance could extend for longer periods and may potentially affect physiological condition, molt, nest success, and survival of individuals.

Placement of gravel fill for roads and pads will likely result in the destruction of breeding habitat and/or actual take of spectacled eiders and/or nests. The Preferred Alternative assumes that 26.3 ha of known habitat would be eliminated by gravel mining operations at the proposed Clover Mine Site (Figure 1). The amount of habitat assumed lost from development of satellite facilities, roads, airstrips, boat launches and gravel pits would total 128 ha (BA Table 1). The Service considers areas covered by gravel as permanently eliminated as productive breeding and foraging habitats for wildlife.

Because some construction and maintenance of production facilities would be done during the summer breeding season, we expect displacement of local breeding individuals from affected sites and probably also from the immediate area (200m). Also, alteration of nesting habitat adjacent to oilfield infrastructure could be caused by delayed snowmelt and compaction of vegetation in areas underlying ice roads, dust fallout from vehicle traffic, thermokarsting from tundra disturbance, and changes in the hydrologic regime due to industrial surface disturbance and water withdraw from local sources. In succeeding breeding seasons, displaced individuals may relocate to nearby habitat. Such displacements are not expected to cause long-term effects on population productivity given the relatively small areas likely to be involved at a given site, but could result in long term or permanent displacement and shift in distribution. The Service assumes that disturbance from development and production is likely to be limited to within 200 meters of the activity; a few eiders may experience temporary, non-lethal effects that may continue through the summer. Therefore, we agree with BLM's estimate that 1556 ha of potential listed eider habitat is likely to be impacted by oilfield infrastructure under the Preferred Alternative (assuming a 200 meter buffer, which in the Service's best professional judgment, is recommended as a protection measure for listed eiders). Because BLM assumes no active mining or pipeline maintenance would occur during the time when spectacled eiders are present in the ASDP Area, we did not consider analyzing impacts within a zone of influence for material sites and pipelines.

While 1556 ha may not represent a significant proportion of the total amount of habitat available on the North Slope, adverse effects to individuals are anticipated. Ultimately, habitat loss on the North Slope could eventually result in population-level effects. The presence of facilities and construction of gravel pads/roads within the ASDP could result in displacement of spectacled eiders from favored habitats and the associated energy costs could result in short-term negative effects during breeding, brood-rearing, or migration. Affected eiders may respond to oil production by relocating before or during the nesting phase, abandoning a nest, or relocating the brood to a more distant area once hatching is completed. Observations from Prudhoe Bay suggest that spectacled eiders exhibit some tolerance of facilities (including production pads) and service roads (TERA 1996). Telemetry studies in 1993 and 1994 showed broods spending time within 200 m (656 ft) of facilities, and crossing roads (five known broods in 1995 and two in 1994) (TERA 1997).

We believe that potential impacts to eider habitat from ice roads and summer storage of equipment on ice pads would be short-term over a small proportion of the available habitat

within the ASDP Area. Construction and operation of production infrastructure and access roads may displace and/or disturb individual eiders. However, the total area affected is small enough that it is not expected to result in population-level impacts. Data collected from CPAI's aerial surveys over the last three years have allowed BLM and the Service to design/place roads and facilities in order to minimize impacts to nesting and brood-rearing eiders and their preferred habitats. Therefore, overall impacts to threatened eiders from habitat loss due to the proposed oilfield activity is likely to be low and will not result in population-level effects.

Collisions with Oilfield Infrastructure

Migrating birds are at risk of collision with objects in their path, particularly when visibility is impaired during darkness or inclement weather, such as rain, drizzle, or fog (Weir 1976). The incidence of bird strikes appears to rise when objects are illuminated with constant diffuse light, and the tendency for birds to be drawn to diffuse light appears to increase during rainy or foggy weather. Accidental strikes of "hundreds" of unidentified eiders were reported to have occurred in association with the Bering Sea crab fishery, presumably influenced by the bright lights used on fishing vessels (Service, unpublished). Comparisons have shown that blinking lights cause less mortality than constant lighting, and the color of the lights and the object may influence collision frequency (Weir 1976). Cross-sectional area also affects the number of birds that strike an obstruction.

Its been reported that 88% of eiders migrating over marine waters flew below an estimated altitude of 10 m (32 ft) and well over half flew below 5 m (16 ft) (Johnson and Richardson 1982). Although information specific to spectacled eider flight behavior is lacking, a spectacled eider was seen striking a utility wire near an electric light in white-out conditions on St. Lawrence Island in 1998 (Service, unpublished). In September-October 2001, several sea duck fatal collisions were documented at Northstar Island and the Endicott oil production facility on the North Slope. In 2001, 36 birds were retrieved at Northstar Island and Endicott, all sea ducks, including 5 king eiders, 23 common eiders, and 8 long-tailed ducks (Service, unpublished). In 2002, 3 long-tailed duck fatalities resulted from platform strikes at Northstar. In 2003, 3 common eiders and 2 long-tailed duck fatalities were recorded at Northstar, 5 common eiders fatally collided with Endicott, and 4 dead/injured spectacled eiders were retrieved by the Service that likely collided with overhead power lines/ guy wires (3 at Barrow and 1 at Prudhoe Bay) (Service, unpublished). To date for 2004, 2 dead/injured spectacled eiders have been retrieved at Barrow likely collided with overhead power lines/ guy wires. The densities of spectacled eiders migrating past the ASDP Area are much lower than those of the species typically found dead at Northstar Island. Therefore, the potential for them striking the proposed trestle structure is much lower.

Because some spectacled eiders on the North Slope migrate to/through the ASDP Area either on route to breeding grounds or when returning to molting/staging areas, drilling, tower and wire structures associated with oil exploration, delineation, development and production may pose a collision risk. Although the total profile of drill rigs, production facilities and associated structures is anticipated to be small relative to the ASDP Area, the Service

believes that proposed structures pose a risk to migrating threatened eiders because: 1) the ASDP lies within the "main routes" used by spectacled eiders migrating east and west to and from breeding grounds east of the Colville River (Johnson and Richardson 1982); 2) the artificial lighting associated with drill rigs and towers may serve as a magnet to migrants, particularly during fog and rain (Weir 1976); and 3) the flight altitude of migrating eiders is low and within the height range of oilfield structures.

Some spectacled eiders on the North Slope migrate through the ASDP Area either on route to breeding grounds or when returning to molting/staging areas. Therefore, based on our understanding of the biology of the species, their migration routes, distribution, behavior, and collision data from Northstar/Endicott, we believe that there is some risk of injury or death of some individuals from collisions with oil field structures. However, the Preferred Alternative includes 2 measures that seek to mitigate this risk. The Preferred Alternative requires all facilities greater than 20 feet in height to have special lighting protocols, and all communication towers/antennas to be located on gravel pads (won't require guy wires). Also, the Preferred Alternative requires that power and communication lines be buried in roads or installed on pipelines to reduce collisions. Therefore, the best available scientific and commercial information does not lead us to believe that significant population-level impacts are likely to result from collisions with the proposed infrastructure.

Increase in Predator Populations

Several North Slope predators that prey on waterfowl eggs and young concentrate in areas where anthropogenic food sources are available. Examples include large gulls, ravens, and arctic foxes that are abundant near camps, roads, oilfields, and villages. For ravens and foxes, there is evidence showing population increases and/or changes in distribution in response to anthropogenic food sources, and the breeding distribution of ravens has expanded on the North Slope because buildings and other structures in oil developments provide nesting sites (Day 1998). The predation pressure that foxes, gulls and ravens exert on ground-nesting birds is also well documented, and in some areas predation is the single most important factor affecting nest success.

Spectacled eiders may be adversely affected by increased numbers or altered distribution of predators. Ravens apparently never successfully nested in Barrow until 1991 when a single pair began raising a brood each year on a man-made structure. In 1991, one of these ravens was seen depredating five eggs from two Steller's eider nests (Quakenbush et al. 1995). Currently ravens are nesting on oilfield infrastructure throughout the Prudhoe Bay Oilfields and into peripheral oilfields such as Northstar Island and Alpine. Although information showing a direct link between oilfield activities and waterfowl nest predation rates is lacking, the Service believes that actions that artificially enhance predator populations pose a potentially significant adverse impact to spectacled eiders.

Solid waste collection from oil and gas activities on the North Slope is closely regulated and monitored by Federal, State, and local governments. The Alaska Department of Fish & Game has long-standing regulations prohibiting the feeding of game animals. The Alaska

Department of Environmental Conservation (ADEC), in a recent upgrade of its solid waste regulations, has begun requiring animal-proof dumpsters across the North Slope. As a result, the North Slope Borough (the local agency responsible for solid waste disposal in the oilfields) outfitted the oilfield with scavenger proof dumpsters manufactured by the Haul-All Corporation, for disposal of putrescible waste. CPAI also holds annual training courses and conducts environmental awareness programs to educate workers on good practices and solid waste regulations.

As stated in the BA, BLM assumes that no new landfills will be constructed to handle wastes from future oilfield activity within the ASDP Area. In addition, the Preferred Alternative states that CPAI is committed to working closely with the Service to implement various strategies to minimize nesting or perching by avian predators on facilities, with a primary emphasis on CD-3. Therefore, as a result of oil activity throughout the ASDP Area, it is unlikely that there will be sufficient amounts of edible refuse and/or additional nesting/denning habitat made available to result in artificially high predator population levels. Based on the limited number of oilfield facilities assumed by BLM and protections proposed in the BA, we do not believe that the proposed action will affect predator populations sufficiently to cause impacts to spectacled eiders.

Increased Subsistence Activity

Alaska Natives have traditionally harvested spectacled eiders and their eggs in coastal villages during spring and fall. Subsistence harvest surveys for the North Slope indicate that an average of 155 spectacled eiders were taken at Wainwright during 1988-1989 and only 2 spectacled eiders were reported taken at Barrow during 1987-1990 (Braund et al. 1993). Although the human population within/adjacent to the ACP has grown substantially, changes in the numbers of active hunters are unknown. Similarly, available harvest technologies have become increasingly efficient, but the actual effects of new technologies on harvest levels are unknown.

Under BLM's Preferred Alternative, oil field development under the ASDP is strictly infield and unconnected to other oilfields and/or road systems. Nonetheless, there remains a possibility that the ASDP's infield roads may allow local hunters increased access to previously inaccessible areas. For example, the proposed developments are to be constructed so that their infield roads are within reach of existing ATV trails extending north out of Nuiqsut. Hence, hunters from several other North Slope Villages might reach the road system by boat and use the roads for motorized access to areas west of the Colville River into NE NPR-A. This increased access could result in added hunting pressure and greater distribution of lead shot.

Those hunters interested in harvesting waterfowl would likely access the proposed oilfield infrastructure during the period immediately following spring breakup, when most local hunters concentrate on geese and other returning birds. Although the Service has made an effort to educate the local hunting public about the plight of spectacled eiders, and has stated that the prohibition against harvest of these species would be enforced, we suspect some

level of harvest continues. However, it is unknown what that level is, or whether the increased access scenario depicted here would result in an increased harvest of spectacled eiders in the vicinity of the ASDP.

The proposed oil field development in the Colville River Delta and into NE NPR-A may result in increased access by bird hunters, which could result in increased lead-shot deposition and distribution in tundra wetlands. It is illegal to use lead shot for waterfowl hunting on the North Slope. Its lethal and sublethal effects from ingestion by eiders and other waterfowl are well established (Flint and Grand 1997). The Service and other agencies have made efforts to educate North Slope residents on this issue, and clinics have been held to train local hunters how to adjust to the different ballistics of steel shot. Nonetheless, lead shot remains available and is still legal for use in hunting upland game birds such as ptarmigan. Whether through illegal use for waterfowl hunting, or legal use for ptarmigan hunting, use of lead shot could result in distribution of pellets in shallow tundra ponds where eiders could ingest them.

Although roads within oilfield developments may increase the access of local waterfowl hunters to previously inaccessible areas, the small additional area BLM assumes will be roaded, combined with the low densities of spectacled eiders around those areas, is not expected to result in sufficient take to trigger population-level impacts. Additionally, local hunters that previously used areas where oil development occurs may actually avoid that area once a development is constructed. Some villagers of Nuiqsut have told BLM staff they have reduced their use of the Colville River Delta in the vicinity of the Alpine development since its construction (BA page 29). Therefore, overall impact to listed eiders from increased subsistence activity is currently expected to be low.

Oil Spills

Spilled oil can have significant impacts on birds. Exposure to oil can affect birds in several ways. Most birds that come into contact with oil die within a short period of time, often through loss of the insulative properties of their plumage so that hypothermia ensues (Hunt 1987, Piatt et al. 1990). Embryos or young can be killed by contact with adults that have oiled plumage (King and Lefever 1979, Peakall et al. 1982). Birds that ingest contaminated food can suffer fatal toxicological effects (Peakall et al. 1983). Species that feed on invertebrates or other organisms that bioaccumulate and/or biomagnify toxins are particularly vulnerable.

Oil spills and associated clean-up could result from the proposed project. Potential sources of spills include a drilling blowout, failure of diesel fuel storage tanks, and spills from trucks used to transport fuel oil. Historical data from North Slope oil production show that between 0 and 102 spills per year occurred from 1970-1997; most were small spills, as mean spill size in all years was < 100 bbl (MMS 2002). BLM estimates that over the useful life of the ASDP the risk of small crude or refined oil spills (<100 gallons) is 100%, medium spills (100-999.5 gallons) is 1.8% and large spills (>1000 gallons) is 0.05%. Small spills, although the most likely, have the least impact to wildlife populations because a smaller area is

affected and fewer individuals are likely to be exposed. Similarly, spills in the terrestrial environment, though possible, will likely have minimal impact because the density of spectacled eiders is relatively low throughout most of the ASDP Area and spills on land spread slowly and will be more easily detected and contained. Therefore, the Service considers that impacts from small spills in the ASDP Area's aquatic and terrestrial environments are not likely to result in take of spectacled eiders.

The expected impacts of oil spills depends on how accurately spill characteristics, as well as the distribution and behavior of the birds are predicted. Estimating the probability of spills is fundamental: if no oil is spilled, there will be no impacts. If one or more spills occur, characteristics such as volume, trajectory, location and timing will greatly influence the impact on eiders. Distribution and use of NE NPR-A, Colville River Delta and the Beaufort Sea by spectacled eiders is equally relevant. Evaluating the likelihood of spills from pipelines and production infrastructure in the ASDP Area's riverine/tidal environments is constrained by the small number of comparable projects in northern Alaska.

Historically, cleanup of spills in the terrestrial environments of the North Slope happens quickly and spills typically remain on limited areas of tundra unless they reach a river, stream, or tidal water body. Off-pad spills on the North Slope generally cover small areas ($<500ft^2$). In aquatic environments cleanup is anticipated to be limited or prevented by ice and weather conditions in the area. In many cases, final cleanup of an oil spill may only be possible from early July through August after the ASDP Area and Beaufort Sea are ice free (National Research Council 1994). Because of unstable and broken ice conditions in the area, once a leak is detected, response for containment and cleanup of a spill will be delayed or hindered during 6 months of the year, and then only as weather permits. In addition, historical recovery rates of spilled oil are traditionally very low even when cleanup is not hampered by Arctic weather and frozen or partially frozen seas. Based on national and international data, recovery rates of 20-25% are considered high and are usually not above 10% (Alaska Department of Environmental Conservation 1998, National Research Council 1994).

Oil spill response activities such as hazing and other human activities (boat and air traffic) could also impact threatened eiders. Hazing may have limited success during spring when migrants occupy open water in ice leads. The hazing effect of cleanup activity or actively hazing birds out of ice leads that oil is expected to enter may be counterproductive, because there are few alternative habitats that flushed birds can occupy. Cleanup activities in leads during May and open water/river channels in July through September are likely to adversely affect spectacled eiders.

In summary, accidental oil spills can have significant impacts on birds as a result of direct and indirect exposure. Potential sources of a spill include a drilling blowout, failure of diesel fuel storage tanks, leaks from pipelines or spills from trucks used to transport fuel oil. Small spills are the most likely to occur but they also have the least potential impact to listed species because a smaller area is affected and fewer individuals are likely to be exposed. Similarly, spills in the terrestrial environment will likely have minimal impact because the

density of spectacled eiders is relatively low in most of the project area and spills on land spread slowly and will be more easily detected and contained. Large spills (≥ 1000 gallons) in the ASDP Area (especially spills from the proposed pipeline running from CD-5 to CD-2 that could enter the Colville River/Beaufort Sea) would have greater impacts. However, the Preferred Alternative assumes that large spills are rare events and only a small portion of oil typically reaches areas off gravel pads. Most large spills do not spread very far and oil spill response activities typically contain spills to <5 acres. CPAI has committed to conduct frequent visual inspections of the pipelines on the bridge crossing the Nigliq Channel during break-up floods in order to identify any potential problems with the bridge because of ice jams or erosion and scour, as well as determine if there were additional risks of pipeline failure, so that flows could be reduced or shut off until integrity was assured. Also, the probability of a large oil spill contacting a significant number of spectacled eiders is further diminished by considerations of timing, ice and weather conditions, effectiveness of spill response, and the dispersed nature of the birds' distribution. The coincidence of all those factors, which would have to occur simultaneously in order to appreciably reduce the likelihood of survival and recovery, is improbable. Thus, we conclude that such an impact is not reasonably certain to occur.

Toxics Contamination

Oil activity may also result in increasing contamination of terrestrial, riverine and marine habitats due to the disposal of drilling muds and cuttings, or accidental eruption of oil from wells during a blowout. Such contamination may impact individuals either through direct contact or indirectly as a result of effects on prey populations or important habitats.

BLM's Preferred Alternative states that a maximum of 2 drill rigs would be operable in any one year, assuming one rig per platform. Discharges that will result from these rigs drilling wells are regulated by the Environmental Protection Agency through a National Pollutant Discharge Elimination System (NPDES). The EPA reinitiated consultation with the Service in July 2004 to determine the likelihood that the proposed discharges associated with oil and gas activities would adversely affect listed species. The Service concurred with the EPA that the proposed NPDES permit issuance would not be likely to adversely affect listed species. Therefore, the EPA and BLM have already satisfied the requirements of the Endangered Species Act regarding effluent discharges associated with the ASDP.

CUMULATIVE EFFECTS

Cumulative effects include future State, local or private actions that are reasonably certain to occur in/adjacent to the considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Due to the large amount of wetlands and surface/subsurface lands under Federal and Native Government management on the North Slope, most land use activities have a federal nexus through required federal permits or federal funding and are therefore not analyzed here.

When analyzing cumulative effects of a proposed action it is important to define spatial boundaries (geographical), temporal boundaries and types of actions that are reasonably foreseeable within those spatial and temporal boundaries. For this analysis of cumulative effects, the spatial boundary is the Arctic Slope of Alaska (North Slope). The North Slope is a 230,000 km^2 region north of the crest of the Brooks Range and is slightly larger than the State of Minnesota. It encompasses drainage basins that empty into the Beaufort and Chukchi Seas. The North Slope is divided into 3 major regions: the ACP, the Foothills and the Brooks Range. Most of the North Slope's surface/subsurface lands are managed by the Federal Government, State of Alaska and Native Corporations (very little private ownership). To date, all oil production has occurred on the ACP, but there is increasing exploration in the foothills. The only directly influenced area in the Brooks Range is the corridor for the Trans-Alaska Pipeline (TAPS), which crosses those mountains at Atigun Pass.

For this analysis, the temporal boundaries are January 1, 2005, to January 1, 2040 (35 years). Under the Preferred Alternative, 2059 is latest date oil infrastructure abandonment activity could still be taking place. A 35-year time frame was arrived at by adding BLM's assumed time frames for the construction phase (5 years), development/production phase (30 years).

Generally, future State, and local government actions are likely to be in the form of legislation, administrative rules, or policy initiatives. Government and private actions may include changes in land use patterns, including ownership, zoning and intensity, any of which could affect listed eiders or their habitat. Even actions that are already authorized are subject to political, legislative, and fiscal uncertainties. These realities, added to the geographic scope of the , which encompasses numerous government entities exercising various authorities and split-estate lands, make any analysis of cumulative effects difficult. Therefore, these issues are addressed in a summary way below.

State Actions

State of Alaska actions reasonably certain to occur within/adjacent to the North Slope over the next 35 years include: oil and gas lease sales, exploration, development, and production; gravel mining, support facility construction, road construction, telecommunication infrastructure construction, pipeline/transport facility construction, and TAPS operation and maintenance. The State of Alaska has conducted annual areawide sales in the Beaufort Sea and on the North Slope since 1995. Each State Beaufort Sea offering extends from Barrow to the Canadian border, while onshore sales offer all unleased State lands between the Arctic National Wildlife Refuge and NPR-A. However, future State of Alaska oil and road building activities will be subject to Federal permitting requirements because these actions would likely occur in wetlands and/or nearshore areas requiring authorizations under the Clean Water Act and Rivers and Harbors Act. Therefore, because Federal approval requires section 7 consultation, the Service does not incorporate these State actions into the cumulative effects.

Local Government Actions
Local and regional government actions reasonably certain to occur within/adjacent to the North Slope over the next 35 years include: oil and gas lease sales, exploration, development, and production; gravel mining, support facility construction, road construction, pipeline/transport facility construction, telecommunication infrastructure construction, land reconveyances from Native corporations to private individuals, subsistence harvest activities, marine shipping, field research, tourism, Village growth and conservation work. Of these actions only marine shipping, field research, tourism, Village growth and conservation work lack a Federal nexus. However, except for Village growth, the Service is not aware of any specific future non-Federal activities on the North Slope that would cause greater impacts to spectacled eiders than presently occurs.

The Service assumes that local governments will be faced with continuing pressures from economic expansion and population growth and movement. There will be demands for intensified development in rural areas, as well as increased demands for water, municipal infrastructure, and subsistence resources. The reaction of local governments to growth and population pressure is difficult to predict without certainty in policy and funding. In the past, local governments on the North Slope generally accommodated growth that may have adversely affected spectacled eider habitat. For instance, as Barrow has grown over the last decade, several acres of comparatively high-density Steller's eider nesting habitat have been lost. However, today the Service and several local governments have positive working relationships and often work together to strike a delicate balance between conserving listed eiders and ongoing Village growth. For instance, local governments are working collaboratively with the Service to develop/adopt a conservation plan aimed at providing a greater opportunity for recovery of listed eiders, while accommodating an increasing human population (Barrow Conservation Plan).

Private Actions
Data quantifying current private activity on the North Slope does not exist, therefore projecting future private actions and corresponding impacts to listed eiders is extremely difficult. Private actions reasonably certain to occur within/adjacent to the North Slope that may impact listed eiders over the next 35 years include: subsistence activities, land use changes, continued accumulation and persistence of lead shot in the environment, and loss of breeding habitat due to off-road vehicle use. The proposed action potentially may impact all these actions of which only land use changes are not described in the Effects of the Action Section. Private landowners may convert their lands from current uses, or they may intensify or diminish those uses. Individual landowners may voluntarily initiate actions to improve habitat, or they may abandon or resist any improvement efforts. Their actions may be compelled by new laws, or they may result from growth and economic pressures. Changes in ownership patterns will have unknown impacts. Whether any of these private actions will occur is highly unpredictable, and the effects even more so. However, due to the miniscule amount of privately held land on the North Slope, any corresponding impacts to spectacled eiders from changes in surface activities on those lands are assumed to be minimal.

In summary, non-Federal actions are likely to continue affecting spectacled eiders on the North Slope. Cumulative effects on the North Slope are difficult to analyze, considering the Area's broad geographic landscape, geographic and political variation, the uncertainties associated with government and private actions, and ongoing changes in the region's economy. Whether those effects will increase or decrease in the future is a matter of speculation; however, based on the population and growth trends identified in the Local Government subsection, cumulative effects are likely to increase. Although local governments are developing plans and initiatives, such as the Barrow Conservation Plan, which may mitigate impacts from increased local activity, these must be finalized and implemented in a comprehensive manner before the Service can consider them "reasonably foreseeable" in an analysis of cumulative effects.

CONCLUSION

After reviewing the proposed action, the current status of spectacled eiders, environmental baseline for the , effects of the proposed action, and cumulative effects, it is the Service's biological opinion that actions outlined within BLM's BA for the ASDP, as proposed, are not likely to jeopardize the continued existence of the spectacled eider. There is no designated or proposed critical habitat on the North Slope for spectacled eiders.

Regulations (51 FR 19958) that implement section 7(a)(2) of the Act define "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." In evaluating the impacts of the proposed ASDP to spectacled eiders, the Service identified a series of direct and indirect impacts that could result, such as disturbance from oil development/production activities, collisions with drill rig facilities by migrants, habitat loss and changes in the number or distribution of predators. However, the Service believes that the combined impacts to spectacled eiders through these avenues will not rise to the level that the likelihood of survival and recovery the species is appreciably reduced for the reasons given in the *Effects of the Action* section of this BO.

Using methods and logic explained in the Incidental Take Statement (which follows this BO), the Service estimates that 4 adult and 3 eggs or young spectacled eiders will be taken during the life of the proposed project. Across the 35-year life of the project, this equates to an average of 0.11 adults and 0.09 eggs or young spectacled eiders taken per year. Thus, on average, about 0.0001 of the adult breeding population and less than 0.0003 of the annual reproductive effort will be taken as a result of this project (assuming a breeding population size of 7149 adults, which result in 3000 pairs producing an average of 3 eggs per pair, both of which are conservative estimates to compensate for possible non-breeding pairs). The Service believes that this level of loss will not significantly affect the likelihood of survival and recovery of the spectacled eider.

It should be noted that for the purposes of determining jeopardy/non-jeopardy for this consultation, the impacts to spectacled eiders were evaluated at the scale of the North Slope breeding population. However, the impacts of the proposed project would also not jeopardize the survival and recovery of the larger global population. Also, it is important to note that the above take estimates fall within the limits of take identified in the 1998 NE NPR-A IAP/EIS BO (25 spectacled eiders). Therefore, the 1998 NE NPR-A IAP/EIS BO is still valid and reinitiation of formal consultation on the 1998 NE NPR-A IAP/EIS is not required.

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, respectively, 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 by the Service 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, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered 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/required by BLM so that they become binding conditions of any grant or permit issued to an applicant, as appropriate, for the exemption in section 7(o)(2) to apply. BLM has a continuing duty to regulate the activity covered by this Incidental Take Statement. If BLM (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. In order to monitor the impact of incidental take, BLM should report the progress of the action and its impact on the species to the Service as specified in the *Terms and Conditions* section of this BO [50 CFR 402.14(i)(3)].

Oilfield Disturbance

We believe that Alpine-like oilfield disturbance can have adverse impacts to spectacled eiders during nesting, but these effects are usually assumed to be minimal in magnitude. Oilfield activity could adversely impact spectacled eiders by: 1) displacing adults and/or broods from preferred habitats during pre-nesting, nesting, brood rearing and migration; 2) displacing females from nests, exposing eggs or small young to inclement weather or predators; and 3) reducing foraging efficiency and feeding time. The behavioral response of spectacled eiders to nesting disturbance is unknown and few quantitative estimates of the

extent of adverse impacts of oilfield activity to nesting waterfowl exist for tundra environments. The few studies that have been done deal specifically with investigator disturbance. Several studies demonstrate negative effects of investigator disturbance on waterfowl nesting success. Infrequently, waterfowl will permanently abandon nests after they are disturbed. On the YKD, investigators estimated that nest trapping resulted in a loss of 5% of cackler geese eggs due to desertion (Mickelson 1975). A single search of study plots for an investigator disturbance study done for spectacled eiders on the YKD caused the loss of 0.08% of egg production (Bowman and Sten 2003). Gulls were attracted to, and more nests were destroyed at, eider nesting islands after disturbance (Ahlund and Gotmark 1989). However, in 1997 investigators marked and visited spectacled eider nests at varying schedules and found no difference in survival or productivity due to observer impact (Grand and Flint 1997).

Potential sources of disturbance addressed in the BA include oilfield construction, oil spill response training, production activity, pipeline maintenance, staging area activity, infield road traffic, increased aircraft traffic, watercraft support, and gravel mining/transport. Disturbance resulting from production activity, infield road traffic, and oil spill response training typically occurs on a regular basis and will likely displace spectacled eiders from nearby habitats (at least 200 m away) rather than periodically disturb them. Therefore, impacts from these activities are best covered in the Habitat Loss subsection of this ITS and are not addressed here. Also, because BLM assumes that major oilfield construction, pipeline maintenance and gravel mining/transport will only occur during the winter months when spectacled eiders are not present in the ASDP Area, this ITS assumes that these activities will not disturb nesting spectacled eiders. Therefore, this section only addresses adverse impacts to listed eiders resulting from aircraft traffic and watercraft support.

1. Aircraft Overflights

Under the Preferred Alternative, we distinguish 3 different types of aircraft operations. Category 1 is point-to-point operations (regular landings at the CD-3 airstrip). These flights are considered relatively predictable in time and space, and of regular occurrence. We do not believe take resulting from this type of flight is likely because listed eiders would have the opportunity to habituate or evacuate themselves from the vicinity of aircraft if they felt threatened.

Category 2 would be fixed-wing flights unpredictable in time and space (i.e. wildlife surveys, VIP flight-seeing, etc.). Impacts from these flights are difficult to assess because BLM doesn't know how many or where they occur. However, BLM believes that they are so infrequent that given the low densities of spectacled eiders in the ASDP Area, they are unlikely to encounter nests.

Category 3 is irregular helicopter trips to off-pad locations in the vicinity of the ASDP Area. We believe take resulting from this type of flight is possible because spectacled eiders would not have the opportunity to habituate to or remove themselves from the vicinity of aircraft if they felt threatened. We do know that the

number of helicopter trips at Alpine have varied greatly year to year. In 2001, there were 776 helicopter landings or takeoffs from Alpine from 1 June to 15 July. Irregular helicopter flights from Alpine are known to flush waterfowl from their nests (Johnson et al. 2003, Service, unpublished). Flushing spectacled eiders from nests can expose eggs or small young to inclement weather or predators. Also, flushing females with ducklings can fragment broods increasing predation.

As described in the *Effects of the Proposed Action* above, spectacled eider adults and/or broods may occur below or adjacent to aircraft routes. At times, listed eiders have been observed foraging near the Deadhorse and Barrow Airports (Service, unpublished). However, disturbance from aircraft overflights to spectacled eiders is unlikely because over most of the there is a low probability that the few sites occupied during breeding and nesting periods would be overflown routinely by support aircraft (CD-3 is an exception). Also, most spectacled eiders that encounter Category 1 type flights would have the opportunity to habituate to or remove themselves from the vicinity of aircraft. Therefore, due to the low densities of spectacled eiders throughout most of the ASDP Area, our projected number of spectacled eiders that may be flushed, a reasonably assumed probability of predation, observed tolerances of nesting eiders to overhead flights near North Slope airports/airstrips, and CPAI's commitment to minimize flights to CD-3 during sensitive nesting periods we do not anticipate that aircraft flights, associated with the Preferred Alternative, will result in take of listed eiders, eggs and/or young.

2. Watercraft Support

Disturbance to spectacled eiders from watercraft support emanating to/from CD-3 is possible. Nonrecreational airboats/jetboats will likely operate in the Beaufort Sea, Colville River channels/sloughs and on seasonally accessible streams, lakes, and estuaries as part of quarterly oil spill response exercises.

Extensive nearshore and offshore aerial surveys in the Beaufort Sea in 1999 and 2000 detected two flocks of spectacled eiders (numbering 40 and 100) offshore in the Harrison Bay area (Fischer at al. 2002). Satellite telemetry work done on spectacled eiders in the Prudhoe Bay oilfields during 2000 and 2001 showed that Smith Bay was an important marine area for females and Gwydyr Bay for males (TERA 2003). It is unlikely vessel traffic emanating from CD-3 will traverse either of these bodies of water. Given the large amount of marine habitat available to spectacled eiders, it is likely that few would encounter vessel traffic. Although numbers of birds displaced could be substantial depending upon the season of occurrence (tens or hundreds of individuals, particularly during fall migration), alternate foraging and staging habitat would be available away from probable routes. We believe that eiders would avoid such encounters by flying away, that the frequency of those disturbances will not reach the threshold that would impair survival, and that alternative suitable habitat is available. In addition, BLM and CPAI have committed to work with the Service to

schedule oil spill response activities outside sensitive nesting and brood-rearing periods. Under these conditions, take is unlikely.

In conclusion, oilfield activities described in the BA could adversely affect individual spectacled eiders. However their low nesting densities combined with the limited amount of oilfield infrastructure/activity assumed throughout the BA, suggest that few individuals would be impacted. Likewise, the wide range of tolerances found in individual birds to this type of potential disturbance makes it difficult to predict whether adverse impacts would actually occur. Therefore, the Service anticipates that no take of spectacled eiders will result from the proposed oilfield activity.

Habitat Loss

Estimating take of listed eiders from oilfield activities such as filling of wetlands, extracting gravel and disturbance from operation oilfield infrastructure is extremely difficult due to a lack of available information on tolerance of sea ducks to oilfield activities and their ability/willingness to relocate successfully to other areas once disturbed. Depending on location and season, oil/gas exploration, development, and production in areas where listed eiders occur could render habitats unavailable due to disturbance or filling/coverage from construction activities, gravel mining, pads, and roads, facilities, and drilling activities. The Service anticipates that incidental take of listed eiders will be difficult to detect because injury or death to eggs, young, or adults may not be directly observed.

Incidental take resulting from oilfield activities is expected to be in the form of harm to adults and killing of eggs and young. Using a conservative approach, the Service and BLM assume that listed eiders will be excluded from breeding habitat within a 200 meter zone of influence around placement of fill for roads and oilfield infrastructure. By multiplying the proposed action's footprint/BLM's assumed zone of influence (200 m) by an assumed density for spectacled eiders for each oilfield within the ASDP Area, we calculate that 1 adult spectacled eider and 3 eggs and/or young would be taken as a result of the proposed action (Table 1).

It is important to note that the above estimates for take due to habitat loss from oilfield development/production activities are crude. The estimates do not take into consideration that the density of nesting spectacled eiders in the may change. For instance, recent aerial breeding pair surveys have identified a short-term shift in high-density spectacled eider nesting within the Northeast Planning Area from areas northeast of Teshekpuk Lake to areas northwest of Teshekpuk Lake (Larned et al. 2003). As additional oilfield development projects are constructed in the vicinity of the ASDP, the Service will be able to generate better assessments of incidental take based on improved estimates of spectacled eider densities in specific areas

Collisions with Drilling Structures and Associated Infrastructure

Although power lines and several communication towers are proposed as part of the ASDP, BLM has stated that all power lines off gravel pads will be hung on pipeline VSMs and that none of the towers will require guy wires. Therefore, we believe that the proposed power lines and communication towers do not represent a collision risk to spectacled eiders. However, the Service anticipates that spectacled eiders may collide with proposed drilling infrastructure. Such losses likely will not affect the species' North Slope population. Limited information available on spectacled eider migration routes, behavior, and vulnerability to obstructions when migrating complicates estimating anticipated collisions. However, the anticipated footprints of drilling infrastructure are likely to be relatively small within spectacled eider migration corridors and we believe the majority of spectacled eiders encountering drill rigs and associate infrastructure during migration are likely to miss or avoid the obstructions.

Estimating the number of spectacled eider fatal collisions is extremely difficult due to a lack of available information on sea duck strikes and the effectiveness of BLM's proposed structure lighting regimes. Limited data is available for common eider (*Somateria mollissima*) strikes to Northstar Island, which is located north of Prudhoe Bay in the Beaufort Sea Outer Continental Shelf (OCS) (560 meter north/south profile). From this data it is possible to extrapolate a strike rate for sea ducks per structure-year by dividing the number of common eider strikes (6) to Northstar Island in 2002 by the most recent population estimate of common eiders migrating west over the Beaufort Sea (111,635) (Suydam et al. 1996, Service, unpublished). That number is then multiplied by the North Slope population estimates for spectacled (7149) (Larned et al. 2001a, Larned et al. 2003, Mallek 2001) to give a "strikes per Northstar-like obstruction/year" estimate for both species. The results of this imprecise methodology estimate that 0.38 spectacled will fatally collide with each Northstar-like structure per year.

BLM's BA states that 1 drill rig would operate in the ASDP Area from 2005 to 2010 (5 rig/years). From 2010 through 2011, 2 drill rigs would operate (4 rig/years). Since the proposed drilling infrastructure will have a smaller vertical profile than Northstar Island, we attempted to adjust for size differences when generating a strike rate. However, without knowing the exact drill rigs to be used (different models vary in size) coupled with the fact that drill rigs are often raised and lowered while stationed over drill sites, we were unable to adjust for the size discrepancy. Therefore, when the proposed years of operation are multiplied by the strike rates generated using the method outlined above (Northstar), we initially estimate 3 spectacled eiders will die from collisions with the proposed drill rig/production infrastructure over the life of the project. However, the Preferred Alternative requires structures that are potential collision hazards to implement marking/lighting regimes in order to reduce collision risk. It has been documented that marked spans of overhead wires resulted in 60% fewer collisions when compared to the same spans prior to marking (Alonso et al. 1994). The lighting regime proposed within the BA is not described in enough detail to allow us to quantitatively estimate the reduction in fatal collisions that may result. However, it is reasonable that BLM's commitment to light the proposed structures will result in fewer spectacled eiders colliding with the proposed infrastructure than if a conventional lighting regime were installed. Hence, for the purposes of this ITS we believe that our

estimate that 3 spectacled eiders will die from collisions with the trestle, platform and associated structures over the life of the proposed action is biased high.

It is important to note that the above estimates for fatal collisions to the proposed number of drill rigs and associated infrastructure are imprecise. The estimates do not take into consideration that eider strikes are episodic in nature, most spectacled eiders never migrate through the ASDP Area, the vertical profile of a drill rig is smaller than that of Northstar Island, that marking and lighting of rigs/structures may not be effective and that the strike rates are generated from only one year of data at a single location in the Beaufort Sea. Therefore, as more data on eider strikes to obstructions in Alaska becomes available, it may be necessary to reinitiate consultation if observed strike rates are higher than estimated for this analysis.

Increase in Predator Populations

State of Alaska, Department of Environmental Conservation regulations that govern refuse management in oilfields include provisions to make it illegal for any person to intentionally feed wildlife or leave human food or garbage in a manner that attracts wildlife [5 AAC 92.230]. The Service assumes that applicants will comply with all applicable regulations governing waste management. The Preferred Alternative commits BLM and CPAI to work closely with the Service to design and implement various strategies to minimize denning, nesting or perching by predators on oilfield facilities, with the primary emphasis on CD-3. Because there will be no increase in predator abundance caused by improper waste management or creation of artificial denning/nesting habitat, the Service anticipates that no additional predation of threatened eiders will result

Increased Subsistence Activity

Alaska Natives have traditionally harvested eiders and their eggs in coastal villages during spring and fall. Subsistence harvest surveys for the North Slope indicate that an average of 155 spectacled eiders were taken at Wainwright during 1988-1989 and only 2 spectacled eiders were reported taken at Barrow during 1987-1990 (Braund et al. 1993). The Preferred Alternative guarantees continued subsistence use and access to traditional subsistence hunting and fishing areas within the ASDP Area. Although the human population within/adjacent to the ASDP Area has grown over the last 3 decades, changes in the numbers of active hunters are unknown. Similarly, available harvest technologies have become increasingly efficient, but the actual effects of new technologies on harvest levels are unknown.

BLM's Preferred Alternative assumes oil development within the ASDP Area will have infield roads (unconnected to other road systems). Nonetheless, there remains a possibility that infield roads may increase the access of local hunters to previously inaccessible areas immediately west of the Colville Delta and into NE NPR-A. This is especially true of the road system connecting CD-2 to CD-5, 6 and 7 that is within reach of watercraft and existing ATV trails extending north out of Nuiqsut. Waterfowl hunters would likely access oilfield

infrastructure during the period immediately following spring breakup, to hunt geese and eiders. Although the Service has made an effort to educate the local hunting public about the plight of spectacled eiders, and has stated that the prohibition against harvest of these species would be enforced, some level of harvest may continue. It is unknown what that level is, or whether the increased access scenario depicted here would result in an increased harvest of spectacled eiders in the ASDP Area.

Although infield roads may allow for increased access for local waterfowl hunters to previously inaccessible areas, the small additional areas that may be opened up, combined with the low densities of listed eiders found in the vicinity of CD-5, 6 and 7 is not expected to result in additional take. Additionally, Nuiqsut hunters that previously used areas where oil development occurs may actually avoid those areas in the future once a development is constructed. Some residents of Nuiqsut have told BLM staff they have reduced their use of the Colville River Delta in the vicinity of the Alpine development (CD-1 and CD-2) since its construction (ASDP BA). Therefore, we expect that additional take is unlikely and the overall impact to spectacled eiders from increased subsistence activity is likely to be minimal.

Oil Spills

Oil spills in the terrestrial environments of the ASDP Area, though possible, will likely have minimal impact because the density of spectacled eiders is relatively low there and spills on land spread slowly and will be more easily detected and contained. Oil-Spill-Risk Analysis modeling results cited within the DEIS estimate that if such a spill does occur over the tundra and then move into local lakes or other interconnected wetlands, small numbers of eiders could die, especially during the brood-rearing period in late summer. Using estimates of spectacled eider density in the central Beaufort Sea and probable spill-trajectory paths, a Service model estimated 2 spectacled eiders would be exposed to a large spill within 30 days in July (Stehn and Platte 2000). A modeling study of risk from pipeline spills in the Alpine, Kuparuk and Prudhoe Bay areas, based on empirical distributions of spectacled eiders during pre-nesting, predicted that 2.5 eiders would be exposed to oil in a 459 ha tundra oil spill (McDonald et al. 2002). Although both of these modeling runs predict that few spectacled eiders would be exposed to a large oil spill, is important to note that they model scenarios for areas that have much lower spectacled eider density than is found in the vicinity of CD-3.

Extent of mortality that will result from oil spills from the proposed action is extremely difficult to estimate. First, it is uncertain that oil will be spilled. As stated in the DEIS, the likelihood of at least one spill of at least 1000 gallons during the life of the DEIS (~35 years) is currently estimated to be 0.05%. In the unlikely event of such an oil spill, the number of oiled eiders will be greatly influenced by the number, location, volume, trajectory, and timing of spills as well as the period that oil remains in the environment. In addition, the low probability of such an event, combined with the uncertainty of the location of the spill, and the seasonal nature of the resources inhabiting the area, make it highly unlikely that a large oil spill would contact a listed eider. Spectacled eiders are present on the North Slope for

only 3-5 months out of the year. Even if an eider were present in the vicinity of an oil spill, it might not be contacted by the oil due to avoidance behavior, ice conditions or weather patterns. Furthermore, BLM is requiring CPAI to have and implement oil-spill-response plans to help prevent oil from reaching critical areas and to remove oil from the environment. Therefore, the probability of a large oil spill contacting a spectacled eider is much less than 0.05% over the 35-year life of the EIS. All of these factors serve to reduce the likelihood that a large oil spill will contact a spectacled eider.

Considering the low probability that an oil spill will contact a spectacled eider, coupled with a variety of other factors that would need to occur before listed eiders would be oiled, the Service anticipates that it is highly unlikely that listed eiders will become oiled from oil spills within the ASDP Area. However, should any oil spill within the ASDP Area result in the oiling or death of any spectacled eider, BLM should order immediate cessation of all operations responsible for the oiling pending reinitiation of consultation.

Toxics Contamination

Oil activity may also result in increasing contamination of marine habitats, due to the release/disposal of drilling muds and cuttings, or accidental eruption of oil from wells during a blowout. Such contamination may impact individuals either through direct contact or indirectly as a result of effects on prey populations or important habitats. Information provided by the BLM indicates that industry's record on the North Slope allows for the assumption of probability of crude-oil release during drilling and production to be 100%, however the majority of spills are on gravel pads and are quickly cleaned up. To mitigate impacts from potential contaminate releases, the Preferred Alternative mandates several design/activity standards aimed at minimizing the impact of contaminants on fish, wildlife and the environment, including wetlands, marshes and marine waters, as a result of fuel, crude oil and other liquid chemical spills.

The EPA reinitiated consultation with the Service in July 2002 to determine the likelihood that the proposed discharges associated with oil and gas drilling would adversely affect listed species. In July 2004, EPA notified BLM that its tentative determination for NPDES discharges associated with the Alpine Satellite Development Plan was to issue coverage to the applicant under the North Slope General Permit (NSGP) and that it is not necessary to consult to cover the proposed facility under the existing NSGP, which had to consider ESA when it was issued. The Service concurs with the EPA that the proposed NPDES permit issuance for North Slope oil and gas activity would not be likely to adversely affect listed species. Therefore, the EPA and BLM have already satisfied the requirements of the Endangered Species Act regarding effluent discharges associated with oil and gas development in the ASDP Area. Therefore, the Service anticipates that no listed eiders will be taken as a result of discharges associated with oil and gas activity.

Conclusion

In conclusion, the Service anticipates the proposed action will likely result in the take of 3 spectacled eiders as a result of fatal collisions with drilling/production infrastructure and 4 from habitat loss. The take is expected to be in the form of killing. The Service has determined that this level of anticipated killing is not likely to result in jeopardy to the species. Also, no designated critical habitat occurs within or near the ASDP Area therefore no destruction or adverse modification or critical habitat would occur.

While the incidental take statement provided in this consultation satisfies the requirements of the Act, as amended, it does not constitute an exemption from the prohibitions of take of listed migratory birds under the more restrictive provisions of the Migratory Bird Treaty Act. However, the Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

REASONABLE AND PRUDENT MEASURES

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of spectacled eiders:

1. To minimize the likelihood that migrating spectacled eiders will strike drill rigs and associated infrastructure within the ASDP Area, BLM and appropriate cooperating agencies and the Service will cooperatively develop a lighting/marking protocol intended to reduce radiation of light outward from structures and to increase the visibility of structures to migrating eiders.

2. To avoid and reduce temporary impacts to productivity resulting from disturbance within 200 meters of occupied spectacled nests, from June 1 through August 1, ground level activity (by vehicle or on foot) within 200 meters of occupied spectacled eider nests will be restricted to existing thoroughfares. Construction of permanent/temporary facilities, placement of fill, alteration of habitat, and introduction of high noise levels within 200 meters of occupied spectacled eider nests is prohibited. The Service does not intend this RPM to be interpreted as a potential restriction on aircraft flights to areas of existing gravel fill and CD-3's airstrip.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, BLM must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. To minimize the likelihood that migrating spectacled eiders will strike structures associated with drilling activities, BLM, cooperating agencies and Service will cooperatively develop a lighting/operating protocol to be used on all drill rigs and associated production infrastructure. The Service and BLM will work together to identify when and where the protocol should be applied. Any protocol developed will be in compliance with Federal Aviation Administration (FAA) regulations. The lighting protocol shall ensure that radiation of light outward from all drill rigs and associated infrastructure will be minimized. This will be achieved by shading and/or light fixture placement to direct light inward and downward to living and work surfaces while minimizing light radiating upward and outward.

2. Temporary impacts to spectacled eider productivity due to disturbance and direct habitat impacts must be minimized by ensuring protection of females with nests. Ground-level activity (by vehicle or on foot) within 200 meters of occupied spectacled eider nests, from June 1 through August 1, will be restricted to existing thoroughfares. This includes "working" gravel on existing fill (pads and roads). Construction of permanent facilities, placement of fill, alteration of habitat, and introduction of high noise levels within 200 meters of occupied spectacled eider nests will be prohibited. In instances where minimal summer support/construction activity must occur off existing thoroughfares, Service-approved nest surveys must be conducted during mid-June of each year in which activities take place between June 1 and August 1. BLM and cooperating agencies will also work with the Service to schedule oil spill response training in riverine, marine and inter-tidal areas, that occurs within 200 meters of shore, outside sensitive nesting/brood-rearing periods or conduct nest surveys. The protocol and timing of nest surveys for spectacled eiders will be determined in

cooperation with the Service, and must be approved by the Service. Surveys should be supervised by biologists who have previous experience with spectacled eider nest surveys.

The Service believes that no more than 7 spectacled eiders will be incidentally taken during the life of the proposed project. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measure provided. The Federal action agency must immediately provide an explanation of the causes of the take and review with the Service the need for possible modification of the reasonable and prudent measure. If spectacled eiders are encountered injured or killed through collisions with the proposed structures, please contact the Fairbanks Fish and Wildlife Field Office, Endangered Species Branch, Fairbanks, Alaska at (907) 456-0499 for instruction on the handling and disposal of the injured or dead bird.

CONSERVATION RECOMMENDATIONS

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 actions be implemented across all phases of this proposed action:

1. To better understand the potential adverse impacts that summer (June 1 to September 31) aircraft flights have on spectacled eiders in NE NPR-A and the Colville River Delta, the Service encourages BLM/CPAI to collect and make available data on aircraft flights associated with construction, operation, support and abandonment of ASDP facilities. The Service is particularly interested in quantifying helicopter flights associated with ASDP-related research and facility tours. Field research, flight seeing and facility tours in North Slope oilfields typically occur during the summer months, but numbers, locations, and type of activities remain speculative. Our experience tells us that on a individual basis, these flights probably do not cause take of spectacled eiders. However, without a greater understanding of the extent of these activities in NPR-A, it is difficult to determine whether the cumulative effects may result in take. It is important to quantify these actions because they could result in: 1) displacing adults and/or broods from preferred habitats during pre-nesting, nesting, brood rearing and migration; 2) displacing females from nests, fragmenting broods and exposing eggs or small young to inclement weather or predators; and 3) reducing foraging efficiency and feeding time.

2. The Service appreciates BLM/CPAI's proposal within the BA to restrict summer access to only small aircraft, and modifying the schedule of construction to reduce traffic

and activity during pre-nesting and nesting season. However, we believe their proposed restricted time periods (June 1 – June 15) will not notably benefit and may actually harm nesting spectacled eiders. By restricting flights during the pre-nesting season and not the nesting season (June 20 – July 20), BLM/CPAI may actually be enticing spectacled eiders to nest in habitats in the vicinity of proposed infrastructure that may become unsuitable for nesting once aircraft disturbance resumes. Therefore, the Service believes that in order to minimize disturbance of nesting, brood-rearing, and migrating spectacled eiders from aircraft flights to/from CD-3:

A. All flights should be restricted/minimized from June 20 to July 20,

B. Flights should not be restricted during the two weeks prior to June 20 (restricted to defined flight routes) in order to discourage spectacled eiders from establishing nests near proposed infrastructure, flight paths and areas of oilfield activity, and

C. All flights to/from CD-3 should occur according to a flight plan to be developed by BLM and CPAI. This flight plan should require pilots to use the shortest/quickest flight path possible from CD-1 to CD-3 in order to minimize the number of nesting spectacled eiders overflown and establish a consistent zone of aircraft disturbance that will allow birds to habituate to flights or evacuate the zone of disturbance. The flight path outlined in the flight plan should not be deviated from unless issues of human safety arise. BLM and CPAI should submit this flight plan to the Service by May 30, 2005.

3. BLM, in cooperation with the applicant, is encouraged to contribute to ongoing migration surveys and satellite telemetry efforts for spectacled eiders and other species of concern that utilize or migrate through the . Monitoring/survey results will allow the Service and BLM to better evaluate abundance, distribution, and population trends of spectacled eiders and other species of concern throughout Arctic Alaska. These results will enhance the Service's and BLM's ability to ensure future activities within NE NPR-A and the Colville River Delta will not jeopardize spectacled eiders or lead to listing additional species.

4. BLM and applicant are encouraged to work with the Service and other Federal and State agencies in implementing recovery actions identified in the spectacled and Steller's eider recovery plans. Research to determine important habitats, migration routes, and wintering areas of spectacled eiders would be an important step toward minimizing conflicts with current and future North Slope oil/gas activities activities.

5. To minimize disturbance of nesting, brood-rearing, and migrating spectacled eiders with aircraft, aircraft activities should be restricted to defined flight routes to the extent practicable. BLM should also work with the Service to cooperatively develop region-specific aircraft flight route strategies for construction, production and support activities (especially important in the Colville River Delta). The applicant should develop procedures to ensure compliance from pilots, and ensure GPS or other navigational aids will be used to minimize deviation from the identified routes. Any decision made in regard to project-specific flight routes will account for safety concerns and will abide by all Federal Aviation Administration (FAA) rules, regulations and policies. This recommendation does not apply to aviation activities conducted when eiders are not present (September 31- May 15).

6. We encourage BLM to require that large structures that pose a collision risk to listed eiders be lighted and/or marked to improve visibility to listed eiders according to a strategy to be jointly developed by BLM and the Service.

> 1) This strategy will be developed using available information on bird avoidance measures including, but not limited to, results of the ongoing study of lighting regimes for Northstar Island being conducted by BP Alaska, ABR, Inc., and the Service.
>
> 2) A draft strategy should be provided by the Service to BLM by 31 May 2005; the final strategy should be mutually agreed upon by BLM and Service by 1 April 2006, or a later date that is mutually agreed upon.
>
> 4) Any lighting requirements resulting from this strategy need not apply between November 31 and May 1, because listed eiders are not thought to be migrating through the ASDP Area during this period.
>
> 5) This strategy should be modified, as appropriate, if significant new information on bird avoidance measures becomes available during activities covered by this consultation. Modifications to the strategy should be developed jointly by BLM and the Service.

Additional conservation recommendations may be proposed during subsequent consultations on oilfield activities in the vicinity of the ASDP Area. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service would appreciate notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the BLM's initiation letter received May 27, 2004. As provided in 50 CFR 402.16, 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 designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. BLM should also reinitiate consultation if it becomes evident that any additional development or activity not described in their BA may take place without separate consultation on that action.

Thank you for your concern for endangered species and for your cooperation in the development of this biological opinion. If you have any comments or require additional information, please contact Jonathan Priday at (907) 456-0499 with the Fairbanks Fish and Wildlife Field Office, Endangered Species Branch, Fairbanks, Alaska.

LITERATURE CITED

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APPENDIX 1

Alpine Satellites Development Consultation History

02/18/03 - BLM publishes Notice of Intent for EIS in the Federal Register.

04/04/03 - BLM emails Service draft consultation initiation letter, Federal Register notice, and two maps outlining locations of proposed project.

04/08/03 - BLM, Service and CPAI hold a conference call to discuss the preferred scope of the biological assessment (BA).

05/07/03 - Service receives request from BLM for list of threatened or endangered species.

05/27/03 - The Corps forwards Service portions of the draft EIS.

07/02/03 - Service, BLM and CPAI hold meeting to update BA scope and schedule.

07/11/03 - BLM emails Service and CPAI to arrange a conference call in which the consultation schedule will be discussed.

07/14/03 - CPAI emails Service and BLM with revised schedule for BA completion.

07/14/03 - CPAI, Service and BLM hold conference call to discuss BA progress.

07/14/03 - CPAI, Service and BLM exchange emails concerning the merits of consulting on satellite or full field development.

07/22/03 - BLM transmits final scope of BA to Service via memorandum.

08/07/03 - CPAI emails annotated outline for BA to Service and BLM.

08/08/03 - Service, BLM and CPAI hold conference call to discuss BA outline, analysis and schedule.

08/30/03 - BLM emails service with their preference for analyzing all the EIS's alternatives in the BA

09/05/03 - Service and BLM exchange emails concerning identification of a preferred alternative in BLM's EIS.

01/08/04 - CPAI and Service exchange emails to discuss delays with the draft BA.

01/12/04 - Service and CPAI exchange emails regarding the Service's inability to participate in a conference call scheduled for 01/15/04.

01/15/04 - BLM and CPAI hold conference call to discuss progress being made on draft BA.

02/03/04 - Service, BLM and CPAI meet to discuss revised schedule for consultation. BLM communicates that BA for Alpine will by done by mid-March, a preferred Alternative will be selected by the third week of April and the ROD will come out by August 2, 2004.

02/04/04 - CPAI's contractor contacts Service to determine if data should be presented in the BA in metric or English units.

02/04/04 - Service and BLM exchange emails concerning BLM's request for a flow chart that outlines the formal consultation process.

02/19/04 - BLM, Service and CPAI review figures and tables that are to be included in the draft BA (scheduled for completion by mid-March).

03/22/04 - BLM and Service exchange emails concerning the Service's need to have clear documentation that both the Coast Guard and the Corps of Engineers are consulting on the ASDP.

03/25/04 - CPAI and the Service exchange emails concerning potential voluntary measures that could be put forth in the draft BA that could reduce impacts to listed species.

03/31/04 - CPAI and the Service exchange emails that clarify that the Service wants the BA to only contain an analysis on the Preferred Alternative.

04/19/04 - CPAI requests a copy of the Service's response memo to BLM initiation of consultation request. Service faxes a copy of the memo.

04/19/04 - Service emails consultation correspondence records to CPAI's contractor.

05/06/04 - Service emails BLM stating concerns over slippage in BLM's original consultation timeline. Service states that they have not received the draft BA that was to have been delivered by the second week of March.

05/14/04 - BLM emails the Service stating that they intend to complete their review of CPAI's draft BA by 05/17/04.

05/19/04 - BLM holds a teleconference with the Service and COE concerning ASDP developments. Specifically, BLM noted that CPAI has provided BLM with a draft BA, BLM has reviewed it and provided edits. BA will be delivered to FWS by May 21, 2004 so Section 7 consultation can begin. The comment period for the COE Public Notice was extended to June 10.

05/20/04 - CPAI's contractor emails the Service asking them how many copies of the draft BA they would like to receive. The Service responds that 2 copies will suffice.

05/25/04 - BLM contacts EPA to inquire if they are aware that BLM is acting as the lead agency for the APSD consultation. EPA responds by saying they are aware that BLM is acting as the lead and that they have determined that the proposed action is covered under one of their general permits (not required to consult).

05/25/04 - BLM and Service hold a conference call to discuss delays with the draft BA. Service states that there will likely be delays in delivering a draft BO by August 2 as a result.

05/26/04 - BLM rewrites draft letter requesting initiation of formal consultation. BLM emails draft letter to Service to review.

05/27/04 - BLM hand delivers draft BA to Service.

05/27/04 - Service faxes the Corps BLM's letter seeking initiation of formal consultation.

05/27/04 - Service and BLM exchange emails concerning BLM's revised letter seeking initiation of formal consultation. Service states that the revised letter is adequate to start the process.

06/01/04 - Corps emails and mails copy of the letter they sent to BLM acknowledging them as the lead agency for the ASDP consultation.

06/02/04 - CPAI's contractor and Service work out additional information needs for the BA via email.

06/21/04 - CPAI and BLM email addendum to BA to the Service.

06/21/04 - CPAI and BLM email the Service minor corrections to the BA addendum.

06/25/04 - Service emails BLM with request for clarification of information contained within the BA addendum.

06/25/04 - BLM emails the Service with a revised deadline for formal consultation completion.

07/13/04 - CPAI emails the Service a mine site restoration plan for the Clover A site in NPR-A.

07/13/04 - CPAI, BLM and Service hold conference call to finalize BA. BLM states that the new deadline for a final BO is September 30.

07/29/04 - BLM contacts Service inquiring on status of BO. Service explains that BO is progressing nicely but work on certain sections can't begin until all information requested on 06/02/04 and 06/25/04 is received.

08/02/04 - Service contacts BLM concerning the status of their supplemental information request and a letter from the U.S. Coast Guard acknowledging BLM as the lead agency for the ASDP formal consultation.

08/02/04 - Service receives BLM's supplemental information and a copy of a U.S. Coast

Guard letter acknowledging BLM as the lead agency for the ASDP formal consultation.

08/30/04 - Service contacts CPAI's contractor looking for additional information concerning gravel coverage and corresponding 200 m buffer zones.

09/10/04 - Service emails draft BO to BLM for review.

09/20/04 - BLM emails revised draft BO with comments to Service for review.

09/20/04 - Service acknowledges receipt of BLM's comments of Draft BO and inquires about deadline for finalizing the document.

09/21/04 - BLM submits additional comments on Draft BO and asks that the Service finalize and sign off on the document by October 1, 2004.

09/21/04 - Service contacts BLM and states their intention to finalize the BO by October 1, 2004. However, they state that completion of formal consultation is dependent on the time BLM requires to review the Revised Draft BO.

09/22/04 - BLM emails the Service revised data quantifying aircraft flights associate with the Preferred Alternative and updated information on the road route to CD-5, 6 and 7 and the proposed Colville River bridge location.

09/27/04 - BLM emails Service final comments/suggestions on Revised Draft BO.

09/28/04 - Service transmits Final BO to BLM that is signed by FFWFO Supervisor.

APPENDIX 2

Ranking of "Peer Reviewed Literature"
(in their general order of preference)

A. **Primary Source:** The information source from which evidence-based knowledge is derived. It has as a major component evidence derived directly from fully described (or referenced) formal observation, procedures or experiments performed with valid, scientifically accepted methods. In its strongest form, this material is usually (but not only) a paper in a refereed scientific publication.

1. **Scientific Refereed Journal:** A journal that has a mission of publicizing and storing primary scientific evidence. By convention evidence published in such a journal is subjected to anonymous review by several experts (referees) in the field prior to publication and is published only once. The methods used to acquire the evidence must be described (or a primary reference cited) with sufficient detail to allow knowledgeable person to critically appraise the study design, replicate the study, or both. *Although the review processes these journals use is designated to ensure the integrity of the procedures, data, and analyses presented in a paper, a significant percentage of published papers still contain serious flaws, some which render the study invalid.* The presence of these flaws is one of the primary reasons why consulting biologists must assess publish literature to determine if a paper is "the best scientific information available."

   Repetition of a study by other researchers, either I whole or in part, helps support of refute the conclusions of a previous study and is essential to the long-term development and acceptance of scientific theory. A paper whose results and conclusions have been verified by independent study or studies is generally a more reliable source that a paper whose results have not been verified in this way.

2. **Scientific Proceedings:** A collection of current research reports, usually presented as brief abstracts, from a scientific meeting. These are a much weaker form of a primary source than is a full scientific journal article because the selection of the abstracts, which are of varying quality, is based on a much more cursory review, the reports are usually incomplete, and much of the work is in-progress. As such, these represent a form of "pre-primary" source.

B. **Integrative Source (Studies):** A source reporting the results of meta-analysis, which is a statistical procedure to mathematically combine the results from a number of valid studies to arrive at a stronger conclusion. An exhaustive search for all of the studies relevant to the question at hand and a critical analysis of these studies to exclude those with serious design or procedural flaws is required.

Integrative studies are based on objective quantitative analysis rather than the more subjective analysis of the conventional critical review.

C. **Secondary Source:** An information source that does not have as a major component the description of formal observations or experiments but rather is synthesized from some combination of primary sources, experience, or authoritative belief (dogma). The primary literature used may have been selected in a biased or incomplete fashion and may have been used without comprehensive critical appraisal to establish the relative strength of evidence in each source. Examples of secondary sources are review articles in publications like *Annual Reviews in Ecology and Systematics*.

D. **Tertiary Source:** A compilation of information for application across a broad spectrum, typically represented by class notes and textbooks intended for use in core courses. The strength of the underlying evidence is not indicated and any current controversy between researches in the area is not addressed. The bibliography is usually predominately secondary literature and is usually intends to provide the interested reader with entry points to the underlying primary literature. Much of the evidence-based information contained in textbooks is filtered sufficiently that it is accepted by most all of the experts in the field, much of it is unlikely to change in the future, and most of the changes will be minor. However, depending on the field, textbooks contain a varying amount of dogma and interpretations of facts that will change with the progress of research in the area, sometimes significantly.

E. **Derivative Service:** A service that presents collections of abstracts, usually from a wide selection of primary literature, selected to meet the interests of a particular group of clinicians. Some derivative services, like *Biosis*, include copies of the abstract that was written by the authors of the journal article. Abstracts vary in quality and abstracters may interpret the evidence of the paper differently than intended by the original authors.

F. **"Gray" Literature:** This category consists of publications that are not "published" or contained in indices (like *First Search* or *Biosis*) that make it easier for other researchers to acquire and examine the results. Gray literature in general includes documents issued by government agencies (federal, state, or local), private consultancies, non-governmental agencies, and private organizations. The quality of the information contained in these documents can compare to that of published, refereed scientific journals (some "gray" literature undergoes extensive peer-review before publication) or it can compare to little more than anecdotal evidence.

APPENDIX 3
Standards of Review

The standards used to prepare the biological opinion discussed in this memorandum are established by the Administrative Procedures Act [APA; 5 U.S.C. 701 et seq.], sections 7 and 10 of the Endangered Species Act of 1973, as amended [ESA; 16 U.S.C. 1536 and 16 U.S.C. 1539, respectively], and regulations promulgated to implement section 7 of the ESA [50 CFR 402].

1. Section 706 of the APA, among other things, cautions against Federal agencies from taking actions that are arbitrary, capricious, or not otherwise in accordance with law. When reviewing biological opinions for compliance with this standard, courts have concluded that biological opinions must demonstrate that USFWS conducted a reasoned evaluation of the best scientific and commercial data available and other relevant information and articulated a rational connection between the facts that were found and the conclusions we reached in our biological opinon.1

2. Section 7(a)(2) of the ESA requires Federal agencies to insure that their actions are not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat. Regulations that implement section 7 of the ESA[50CFR 402] define "jeopardize the continued existence of" as to engage in an action that reasonably would be expected to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

3. Section 7(a)(2) of the ESA requires Federal agencies to utilize the best scientific and commercial data available when insuring that their actions are not likely to jeopardize the continued existence of listed species in the wild or destroy or adversely modify designated critical habitat.

4. Section 10(a)(1)(A) of the ESA authorizes NMFS and the Service to permit any act otherwise prohibited by section 9 of the ESA for scientific purposes or to enhance the propagation or survival of the affected species.

5. Section 10(d) of the ESA allows the Secretary to grant exceptions under subsection 10(a)(1)(A) and (b) only if he finds and published his finding in the Federal Register that (1) such exceptions were applied for in good faith, (2) if granted and exercised will not operate to the disadvantage of such endangered species, and (3) will be consistent with the purposes and policy set forth in section 2 of the ESA[2].

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[1] See *Idaho Department of Fish and Game v. National Marine Fisheries Service et al.* [850 F. Supp. 886(D.Or 1994)] in which the court concluded that "judicial review is limited to an assessment of whether the agency "conducted a reasoned evaluation of the relevant information and reached a decision that, although perhaps disputable, was not arbitrary or capricious." *Mt. Graham Red Squirrel v. Espy* 986 F.2d 1568 (9th Cir. 1993). "A biological opinion is arbitrary and capricious and will be set aside when it has failed to articulate a satisfactory explanation for its conclusions or when it has entirely failed to consider an important aspect of the problem. While courts must defer to an agency's reasonable interpretation of equivocal evidence, such deference is not unlimited. The presumption of agency expertise may be rebutted if its decisions, even though based on scientific expertise, are not reasons." *Greenpeace et al. v NMFS* 55 F.Supp. 2d 1248.

[2] Section 2 of the Endangered Species Act of 1973, as amended establishes the purpose of the Act as to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in section 2(a) of the Act. Section 2 of the Act also sets the policy of the Congress that all Federal departments and agencies shall seek to conserve endangered species and threate4nd species and shall utilize their authorities in furtherance of the purposes of the Act.

30 August 2004

Memorandum

To: Administrative record for consultation on the Alpine Satellites Development Project

From: Jonathan Priday, U.S. Fish and Wildlife Service, Region 7, Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska

Subject: Evidence and reasoning to support the scope and conclusions of the September 7, 2004, biological opinion on the Bureau of Land Management's proposed Alpine Satellites Development Project

I drafted a biological opinion on the BLM's proposed biological assessment (BA) and Draft Environmental Impact Statement (DEIS). The biological opinion concludes that the proposed action is not likely to jeopardize the continued existence of threatened and endangered species in the . This memorandum summarizes the evidence I considered and evaluated before reaching that conclusion and reasoning I applied to reach the conclusion. The standards of review I used as the basis for my analyses are summarized in Appendix 2.

Literature Searches

The primary sources of information I used for this consultation were BLM/CPAI's BA and papers written up for studies conducted/sponsored by the U.S. Fish and Wildlife Service (Grey Literature: see Appendix 2). It was fortunate that BLM/CPAI's BA was written by ABR, Inc. ABR has been collecting aerial survey and nest search data on spectacled eiders in the for over a decade and information included within their BA made meaningful contributions to our understanding of spectacled eider density and habitat use in the Colville river Delta. The study papers I used were predominately unpublished and dealt primarily with distribution and abundance of spectacled eiders, life history, breeding biology, distribution and abundance of potential predators, and impacts of nesting disturbance. Copies of these reports are on file with the Fairbanks Fish and Wildlife Field Office. Because very few published studies have been done on spectacled eiders within the ASDP Area, these reports proved the best scientific and commercial data available. I also extracted several primary sources from the reference sections of the recovery plans for spectacled eiders (see Appendix 2).

To supplement this information, I conducted numerous literature searches for primary, integrative and secondary sources using the U.S. Fish and Wildlife Service's Threatened and Endangered Species System (TESS), National Conservation Training Center E-Library, and Reference Service (FWRS). The TESS provides advanced species search

and report information. The FWRS receives, indexes, stores and distributes copies of reports produced by State fish and wildlife agencies from research studies supported by Federal Aid in Sport Fish Restoration Act and Federal Aid in Wildlife Restoration Act funding. FWRS also receives reports produced by the Anadromous Fish Conservation Program, the Endangered Species Grant Program, and the Cooperative Fish and Wildlife Research Units. Additional collections located at FWRS include the Lead Shot/Lead Poisoning Clearinghouse, Boating Access/Boating Facilities Clearinghouse, and the Clean Vessel Act Education/Information Clearinghouse.

I ended literature searches on August 14, 2004, to make it possible to complete the draft BO two weeks before BLM's anticipated September 30, 2004 Record of Decision (ROD). I imported the results of all my literature searches into a single file, examined all of the relevant results through the National Conservation Training Center Electronic Library, the University of Alaska Fairbanks Library and a small library located at the Fairbanks Fish and Wildlife Field Office.

During this consultation, I was fully aware of the controversy surrounding BLM's proposal. I had read testimony from public hearings held in Anchorage and Fairbanks, Alaska on the proposed DEIS for the ASDP and thought about all of the arguments raised by supporters and opponents. To determine if these arguments could be supported by more rigorous analyses, I conducted additional literature searches. I also attended a BLM scooping meeting in Fairbanks, Alaska, on plans to revise their NE IAP/EIS according to the current model being utilized for the NW Planning Area. In doing so, I hoped to gain additional insights into the implications to spectacled eiders of BLM's new approach to managing oil and gas development within NPR-A. I also hoped to better understand the potential for increased cumulative impacts to spectacled eiders resulting from BLM's plans to strip out several of the 1998 NE IAP/EIS's wildlife stipulations which would have implications for full field development of BLM's Alpine Subarea.

Despite the information I gathered from literature searches and public meetings, I was confronted with a lack of available information on the abundance/distribution of spectacled eiders on the North Slope beyond a small number of areas (Barrow, Colville River Delta and Prudhoe Bay). Over the last decade the Service has undertaken actions to identify and reduce data gaps concerning spectacled eider demographics in order to improve the quality and quantity of data for future decision-making (e.g. recovery plans and biological opinions). However, for several reasons it is unreasonable to expect that sufficient data will ever be available to meet our needs. Spectacled eiders are intrinsically difficult to study. Detecting even fairly large changes in their population densities and demographic characteristics is extremely difficult no matter how much money is allocated for research. Also, adequate experimental controls are nearly impossible to establish.

Species that I Considered in the Opinion

I concluded that the actions considered in the biological opinion "may affect"[1] the following species and critical habitat provided protection under the Endangered Species

Act of 1973 (16 U.S.C. 1531 et seq.; ESA), because they are present in the proposed . At the time BLM initiated formal consultation there were no proposed or candidate species that utilized or migrated through the . I used the "may affect" determination as the basis for including species because that is the standard for formal consultation when an action has not undergone informal consultation [see 50 CFR 402.14(a)-(b)]. Using this standard, I included the following species in the biological opinion:

Spectacled eider	*Somateria fischeri*	Threatened

Species and Critical Habitat That Were Not Included in the Opinion

Steller's eiders (*Polysticta stelleri*) occur irregularly within the ASDP Area. Aerial surveys conducted by the Service and CPAI in the ASDP Area from 1999-2003 recorded very few Steller's eiders. Nest searches conducted by CPAI in the ASDP Area intermittently from 1992-2003 found no nesting Steller's eiders. Therefore, due to the limited occurrence of Steller's eiders in the , no adverse impacts to the species are anticipated as a result of the proposed project. However, historical observations indicate that Steller's eiders may have historically occurred in much higher densities near the ASDP Area than they do today. It is possible that Steller's eider densities near the ASDP Area may increase if the Alaska-breeding population recovers.

I also did not include the endangered short-tailed albatross (*Phoebastria albatrus*) in the biological opinion. Short-tailed albatrosses forage widely across the temperate and subarctic North Pacific, and can be seen from the Gulf of Alaska, west along the Aleutians and north throughout the Bering Sea (as far north a Little Diomede). The limits of its range are far south of the NW Planning Area so short-tailed albatrosses are not likely to be affected by the proposed action.

Approach to the Effects Analysis

My initial challenge was developing an assessment approach that I could apply to this consultation and also use for subsequent biological opinions that would result from full field development of the Alpine Subarea. I initially looked at several avenues of effects; aircraft overflights, watercraft activity, habitat loss, construction activity, staging area expansion/activity, exploration/delineation activity, developmet/production activity, drill rig/tower collisions, increasing predator populations, oils spills, toxics and cumulative effects. As I examined the various modes of effect, I looked for assessment approaches and worked with BLM to develop various assumptions that would (a) provide for the strongest inference possible, given the gravity of the potential effect of oil exploration/development and the unknowns; (b) could be comprehended by an informed lay person; and (c) would not be defeated by large amounts of uncertainty.

Reviewers

Ted Swem (Fairbanks Fish and Wildlife Field Office, USFWS) and Steve Lewis (Fairbanks Fish and Wildlife Field Office, USFWS) reviewed the species description and

effects analysis for correctness. Ted Swem (USFWS), Jim Ducker (BLM), Bruce Hollen (BLM), reviewed the project description for correctness. Steve Lewis (USFWS), Ted Swem (USFWS), Bruce Hollen (BLM) and Jim Ducker (BLM) reviewed the incidental take, reasonable and prudent measures and conservation recommendation sections.

Figure 1: Alpine Satellite Development Project Layout

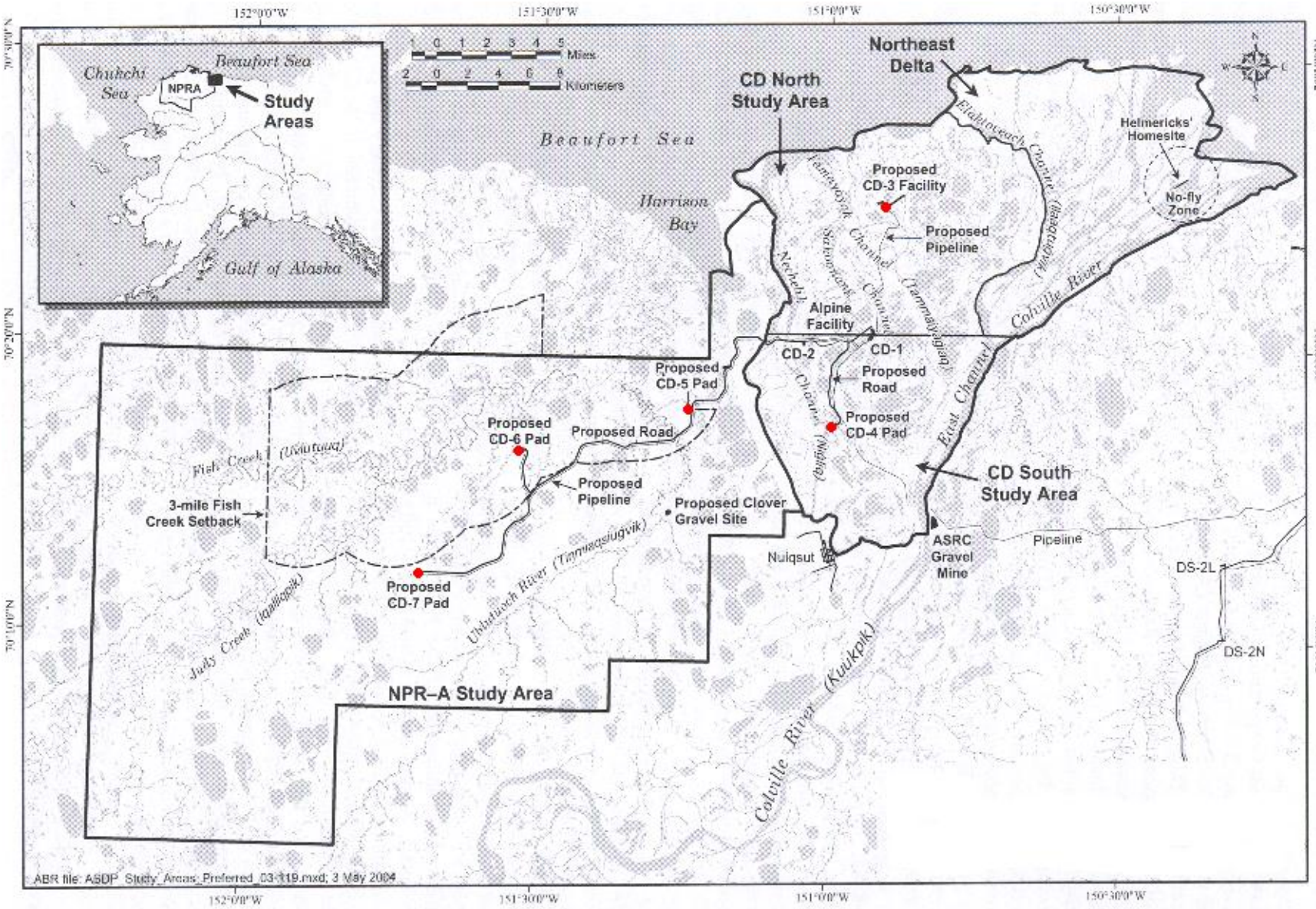

Figure Taken From CPAI ASDP Biological Assessment