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

May 16, 2012

MEMORANDUM

To: **Richard Lanctot, Shorebird Coordinator, Alaska Region Migratory Bird Management**

From: **Neesha Stellrecht, Acting Branch Chief, Endangered Species**

Subject: **Biological Opinion: Wildlife Conservation Society shorebird breeding ecology and artificial nest depredation studies near Prudhoe Bay, Alaska, 2012 and 2013**

Cc: **Rick Lanctot, Migratory Bird Management**
Greg Balogh, Coordinator, Arctic LCC

This memo transmits the U.S. Fish and Wildlife Service's (Service) final Biological Opinion (BO) in accordance with Section 7 of the Endangered Species Act of 1973, as amended, on the effects of a proposal by the Wildlife Conservation Society to conduct shorebird breeding ecology and artificial nest depredation studies near Prudhoe Bay, Alaska in summer 2012 and summer 2013. Long-term field studies at this site are part of the Arctic Shorebird Demographics Network (ASDN). USFWS Migratory Bird Management (MBM) conducts research at multiple ASDN sites and provides science and field coordination support for the ASDN. MBM requested consultation for ASDN activities at 7 sites in northwestern and northern Alaska on April 10, 2012. Preliminary review of activities at the ASDN sites indicated formal consultation was required for the Prudhoe Bay site. The ASDN also receives partial funding from the USFWS Division of Bird Habitat Conservation through the Manomet Center for Conservation Sciences and from the USFWS Arctic Landscape Conservation Cooperative.

The BO evaluates the effects of the proposed Action on Alaska-breeding Steller's eiders (*Polysticta stelleri*), spectacled eiders (*Somateria fischeri*), polar bears (*Ursus maritimus*), and polar bear critical habitat. The Service has determined the Proposed Action may affect but is not likely to adversely affect Steller's eiders, polar bears, or polar bear critical habitat and may adversely affect spectacled eiders. Following review of the status and environmental baseline of spectacled eiders and analysis of the potential effects of the proposed Action to the species, the Service has concluded the Proposed Action is not likely to jeopardize the continued existence of spectacled eiders.

If you have comments or concerns regarding this BO, please contact Neesha C. Stellrecht, Acting Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office at (907) 456-0297.

Biological Opinion

for

The Wildlife Conservation Society's

2012 and 2013 Avian Field Studies near Prudhoe Bay, Alaska

Prepared by:
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May 16, 2012

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1. INTRODUCTION

This document is the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion (BO) on a proposal by the Wildlife Conservation Society (WCS) to conduct shorebird breeding ecology and artificial nest depredation studies near Prudhoe Bay, Alaska in summer 2012 and summer 2013. Long-term field studies at this site are part of the Arctic Shorebird Demographics Network (ASDN). USFWS Migratory Bird Management (MBM) conducts research at multiple ASDN sites and provides science and field coordination support for the ASDN. MBM requested consultation for ASDN activities at 7 sites in northwestern and northern Alaska on April 10, 2012. Preliminary review of activities at the ASDN sites indicated formal consultation was required for the Prudhoe Bay site. The ASDN also receives partial funding from the USFWS Division of Bird Habitat Conservation through the Manomet Center for Conservation Sciences and from the USFWS Arctic Landscape Conservation Cooperative.

This BO describes the effects of the Proposed Action on spectacled eiders (*Somateria fischeri*), Steller's eiders, (*Polysticta stelleri*), polar bears (*Ursus maritimus*), and polar bear critical habitat pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). We used information in the project description provided by the WCS on March 8, 2012 and subsequent communications, USFWS documents, published and unpublished literature, and other sources of information to develop this BO.

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

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

The Service has determined the Proposed Action may affect but is not likely to adversely affect polar bears and Steller's eiders and is likely to affect spectacled eiders. After reviewing the status and environmental baseline of spectacled eiders and analysis of the potential effects of the Proposed Action to them, the Service concludes the Proposed Action is not likely to jeopardize the continued existence of spectacled eiders.

If you have comments or concerns regarding this BO, please contact Neesha C. Stellrecht, Acting Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office at (907) 456-0297.

2. DESCRIPTION OF THE PROPOSED ACTION

The WCS proposes to conduct the following three studies in the Prudhoe Bay oilfields during the period of 1 June and 20 July in 2012 and 2013:

- Long-term nest monitoring project
- Artificial nest experiment
- Bird use of rehabilitated oilfield pads

The WCS estimates that each study area will be visited 8-12 times during each field season. Tundra access will be on foot. Field crews will be housed at BP Exploration (Alaska) Inc. (BPXA) permanent camp facilities and will follow the Polar Bear Interaction Plan for BPXA Areas of Operation during all field work. Field activities are summarized below.

Long-term Nest Monitoring

Investigators will conduct nest searches by both rope dragging (2x per season) and by observing behavioral cues in nesting shorebirds and passerines during single-person search surveys (2x per season) within 12 10-ha long-term study plots in the Prudhoe Bay oilfields. Discovered nests will be revisited every 3–4 days until they are no longer active. A subset (15) of shorebird and passerine nests on or near study plots would also be monitored using Reconyx™ PC 900 Hyperfire™ remote cameras. Cameras are placed ~5 m from active nests and would be visited every 3–4 days to check nests and maintain the cameras. Investigators will also collect habitat data and conduct point counts of predators and lemmings on the plots. Plots will be accessed by driving on established roads to the nearest pull out or oilfield facility and hiking to the plots.

Artificial Nest Experiment

The experiment will consist of a paired artificial shorebird and duck nest trial early in the season and a second artificial shorebird trial later in the season. Shorebird nest trials will each last 20 days, which is the approximate incubation period for most *Calidris* shorebirds at the study site; the duck nest trial will last 25 days, the approximate incubation period for the northern pintail (*Anas acuta*), the most abundant duck at the site. For early season trials, artificial nests will be placed on 3 paired 3-km transects. Shorebird and duck transects will be spaced approximately 300 m from one another. Late season shorebird trial will use three single transects. Artificial nests (40 per transect) will be placed at approximately every 75-m intervals along each transect. Transects will originate at oilfield infrastructure and extend into the surrounding tundra. Each simulated artificial nest will hold either 4 Japanese quail (*Coturnix japonica*) eggs to simulate shorebird eggs or 3 domestic duck eggs to simulate northern pintail eggs. All artificial nest locations will be marked with a GPS as well as plain tongue depressors placed five meters from each nest. Artificial nests will be monitored every three days. A nest will be assumed predated if at least one egg is removed or damaged.

Five artificial nests will be monitored using Reconyx™ PC 900 Hyperfire™ remote cameras to monitor and identify nest predators. Cameras will be placed within five meters of each nest, with the infrared beam aligned about 0.15 meters above the nest. Cameras will be checked every three days as nests are monitored and will be moved to new artificial nests after a predation event.

Plots will be accessed by parking at the oilfield facility and walking along the artificial nest transect. Field crews may take a zigzag route to revisit nests or walk a different path back to the vehicle after the nests are checked to avoid cueing in predators to their presence.

Bird Use of Rehabilitated Oilfield Pads

The WCS will assess bird use at rehabilitated sites using nest searches, bird surveys, and microhabitat characteristics for the selected sites as well as a subset of undisturbed sites within long-term nest monitoring plots. Researchers will conduct two nest searches using behavioral techniques from methods described in Liebezeit et al. (2009) in a subset of approximately 6–12 rehabilitated (rehab) BPXA-operated sites in the Prudhoe Bay oilfields. The location of each nest will be marked with a GPS waypoint and a tongue depressor placed ~5 m north of the nest. Nests will be monitored every 3–6 days to estimate nest survivorship. Researchers will also conduct at least four point, line-transect, and area search bird surveys at each rehabilitated sites and at randomly selected sections of nest monitoring plots. A minimum of 20 foraging and nest/brood rearing sites will be selected within the rehabilitated sites for microhabitat assessments. Ground cover, degree of relief (roughness), and presence or absence of water will be evaluated in a 2 × 2 m plot at the center of each selected area. The same microhabitat variables will be assessed at paired random sites selected within the same rehabilitated plot using the same methodology to allow comparison. Rehabilitated plots will be accessed by parking on the nearest pull out or oilfield facility adjacent to the rehabilitated plot. Nest monitoring plots will be accessed by driving on established roads to the nearest pull out or oilfield facility and hiking to the plots.

Conservation Measures for Spectacled Eiders

- Within study areas – Field crews will maintain a distance of ≥100 m from known, active spectacled eider nests while working within long-term nest plots and rehabilitated sites. Researchers may also select an alternative rehabilitated and/or nest monitor plot section to sample, but long-term plots would not be relocated.

- Hiking routes to access long-term nest plots – Field crews will divert around known, active spectacled eider nests by ≥200 m when accessing the plot for the remainder of the season.

- Artificial nest transects – Transects will be relocated at ≥100 m away from nests discovered during placement of artificial nests along transects.

- Return hiking routes for artificial nest transects – Field crews will divert around known, active spectacled eider nests by ≥200 m when hiking back from the end of a transect for the remainder of the season.

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 studies includes study plots and transects. The area indirectly affected by the Proposed Action is delineated by a zone of influence surrounding field activities, which is assumed to be 200 m (656 ft) for spectacled eiders and 1.6 km (1 mi) for polar bears..

3. EFFECT DETERMINATIONS FOR POLAR BEARS AND THEIR CRITICAL HABITAT

Polar Bears

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, feeding, breeding, denning, resting, and 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). Female polar bears excavate maternal dens in snow drifts in areas with suitable topographic relief in terrestrial habitats as well as on pack ice. While dens do occur in the region, there are no historic observations within the Action Area and females will not be denning during the period in which field studies will occur. In Alaska, non-denning polar bears usually occur on sea ice, but may occupy onshore habitats during the open-water period in late summer and early fall (reviewed in Schliebe et al. 2008). Thus, non-denning bears may occasionally travel through the Action Area. We expect most transient bears would move quickly through the area to a less disturbed location with minimal disruption of their normal behavior patterns; however, potential encounters with polar bears in the project area could result in harassment, injury, or killing of bears and pose a risk to human safety. Field crews will follow the Polar Bear Interaction Plan for BPXA Areas of Operation to reduce potential adverse effects to polar bears associated with negative polar bear–human interactions by managing food and other wastes that may attract bears to the project site and supporting early detection and appropriate responses by field personnel if polar bears do enter the area. The Service has determined effects to denning polar bears would not occur based on project timing and effects to non-denning bears would be insignificant because transient polar bears are likely to experience only minor and short-lived effects associated with disturbance from field crews and minimization measures are in place to reduce further potential adverse effects should a polar bear enter the oilfields. Accordingly, we conclude the Proposed Action is not likely to adversely affect polar bears.

Polar Bear Critical Habitat

Proposed activities will occur within designated terrestrial denning habitat for polar bear (USFWS 2010), which extends 8 km (5 mi) inland from the coast in the Prudhoe Bay area. Proposed activities will not affect the physical integrity of terrestrial denning habitat and would not produce a persistent disturbance that could diminish the conservation role of surrounding critical habitat. Therefore, we conclude effects to polar bear critical habitat would be discountable and the proposed action is not likely to adversely affect polar bear critical habitat.

4. EFFECT DETERMINATION FOR STELLER'S EIDER

In Alaska, Steller's eiders breed almost exclusively on the Arctic Coastal Plain (ACP), migrating to the breeding grounds in late spring and remaining in the region as late as mid-October. However, nesting is concentrated in tundra wetlands near Barrow, AK and Steller's eiders occur at very low densities elsewhere on the ACP (Larned et al. 2010). USFWS aerial surveys for breeding eiders conducted on the ACP from 1992–2010 detected only 5 Steller's eiders east of the Colville River, with the most recent observation in 1998 (USFWS Alaska Region Migratory Bird Management, unpublished data). Because available data indicate Steller's eiders are unlikely to nest near or migrate through the Action Area, we conclude that adverse effects to the species will be discountable and that the Proposed Action is not likely to adversely affect Steller's eiders.

5. STATUS OF THE SPECTACLED EIDER

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 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 (Figure 3.9A) Spectacled eiders were listed as threatened throughout their range on May 10, 1993 (USFWS 1993) based on indications of steep declines in the two Alaska-breeding populations. There are three primary spectacled eider populations, each corresponding to breeding grounds on Alaska's North Slope, the Yukon–Kuskokwim Delta (YKD), and northern Russia. The YKD population declined 96% between the early 1970s and 1992 (Stehn et al. 1993). Data from the Prudhoe Bay oil fields (Warnock and Troy 1992) and information from Native elders at Wainwright, AK (R. Suydam, pers. comm. in USFWS 1996) suggested concurrent localized declines on the North Slope, although data for the entire North Slope breeding population were not available. Spectacled eiders molt in several discrete areas (Figure 3.9B) during late summer and fall, with birds from the different populations and genders apparently favoring different molting areas (Petersen et al. 1999). All three spectacled eider populations overwinter in openings in pack ice of the central Bering Sea, south and southwest of St. Lawrence Island (Petersen et al. 1999; Figure 3.9B), where they remain until March–April (Lovvorn et al. 2003).

Life History

Breeding – In Alaska, spectacled eiders breed primarily on the North Slope (ACP) and the YKD. On the ACP, 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 ACP (Figure 3.10). Although spectacled eiders historically occurred throughout the coastal zone of the YKD, they currently breed primarily in the central coast zone within about 15 km (~9 miles) of the coast from Kigigak Island north to Kokechik Bay (USFWS 1996). However, a number of sightings on the YKD have also occurred both north and south of this area during the breeding season (R. Platte, USFWS, pers. comm. 1997).

Spectacled eiders arrive on the ACP breeding grounds in late May to early June. Numbers of breeding pairs peak in mid-June and decline 4–5 days later when males begin to depart from the breeding grounds (Smith et al. 1994, Anderson and Cooper 1994, Anderson et al. 1995, Bart and Earnst 2005). Mean clutch size reported from studies on the Colville River Delta was 4.3 (Bart and Earnst 2005). Mean spectacled eider clutch size near Barrow was 4.1 ± 0.3 SE in 2009–2010 and 4.7 ± 0.3 in 2011 (Safine 2011, Safine *in prep*). Hatching occurs in mid-July (Bart and Earnst 2005, Safine 2011, Safine *in prep*).

(A)

(B)

Figure 3.1. (A) Male and female spectacled eiders in breeding plumage. (B) Distribution of spectacled eiders. Molting areas (green) are used July –October. Wintering areas (yellow) are used October –April. The full extent of molting and wintering areas is not yet known and may extend beyond the boundaries shown.

Nest initiation on Kigigak Island on the YKD occurs from mid-May to mid-June (Lake 2007). Incubation lasts approximately 24 days (Dau 1974). Mean spectacled eider clutch size is higher on the YKD compared to the ACP. Mean annual clutch size ranged from 3.8–5.4 in coastal areas of the YKD (1985–2011; Fischer at al. 2011), and 4.0–5.5 on Kigigak Island (1992–2011; Gabrielson and Graff 2011), with clutches of up to eight eggs reported (Lake 2007).

On the breeding 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. Ducklings fledge approximately 50 days after hatch, and then females with broods move directly from freshwater to marine habitat to stage prior to fall migration.

Survivorship – Nest success is highly variable and thought to be influenced by predators, including gulls (*Larus* spp.), jaegers (*Stercorarius* spp.), 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; low nest success was attributed to predation (Pearce et al. 1998). On the ACP, apparent nest success was 40% for 15 spectacled eiders nests monitored in the Prudhoe Bay oil fields from 1981 to 1991 (Warnock and Troy 1992) and 35% (range 27–42%) for nests in the Kuparuk oilfields in 1993–1998 (Anderson et al. 1998). On Kigigak Island in the YKD, 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) or when foxes were eliminated from the island prior to the nesting season. Estimates of spectacled eider nest success within the YKD coastal zone in 1985–2011 varied from 45% to 93% (Fischer at al. 2011).

Available data indicates egg hatchability is high for spectacled eiders nesting on the ACP, in arctic Russia, and at inland sites on the YKD, but considerably lower in the coastal region of the YKD. 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 YKD during the early to mid-1990s contained inviable eggs and ~10% of eggs in successful nests did not hatch due to either embryonic mortality or infertility (Grand and Flint 1997). This relatively high occurrence of inviable eggs near the coast of the YKD may have been related to exposure to contaminants (Grand and Flint 1997). It is unknown whether hatchability of eggs in this region has improved with decreased use of lead shot in the region and natural attenuation of existing lead pellets (Flint and Schamber 2010) in coastal YKD wetlands.

Recruitment rate (the percentage of young eiders that hatch, fledge, and survive to sexual-maturity) of spectacled eiders is poorly known (USFWS 1999) because there is limited data on juvenile survival. In a coastal region of the YKD, duckling survival to 30 days averaged 34%, with 74% of this mortality occurring in the first 10 days, while survival of adult females during the first 30 days post hatch was 93% (Flint and Grand 1997).

Fall migration and molting – As with many other sea ducks, spectacled eiders spend the 8–10 month 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). Results of recent satellite telemetry research (2008–2011) are consistent with earlier studies (Matt Sexson, USGS, pers. comm.). Phenology spring migration and breeding, including arrival, nest initiation, hatch, and fledging, is 3–4 weeks earlier in western Alaska (YKD) compared to northern Alaska (ACP); however, phenology of fall migration is similar between areas. Individuals depart breeding areas July–September, depending on their breeding status and molt in September–October (Matt Sexson, USGS, pers. comm.).

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. Most adult males marked in northern and western Alaska in a recent satellite telemetry study migrated to northern Russia to molt (USGS, unpublished data). Results from this study also suggest that male eiders are likely follow coast lines but also migrate straight across the northern Bering and Chukchi seas in route to northern Russia (Matt Sexson, USGS, pers. comm.).

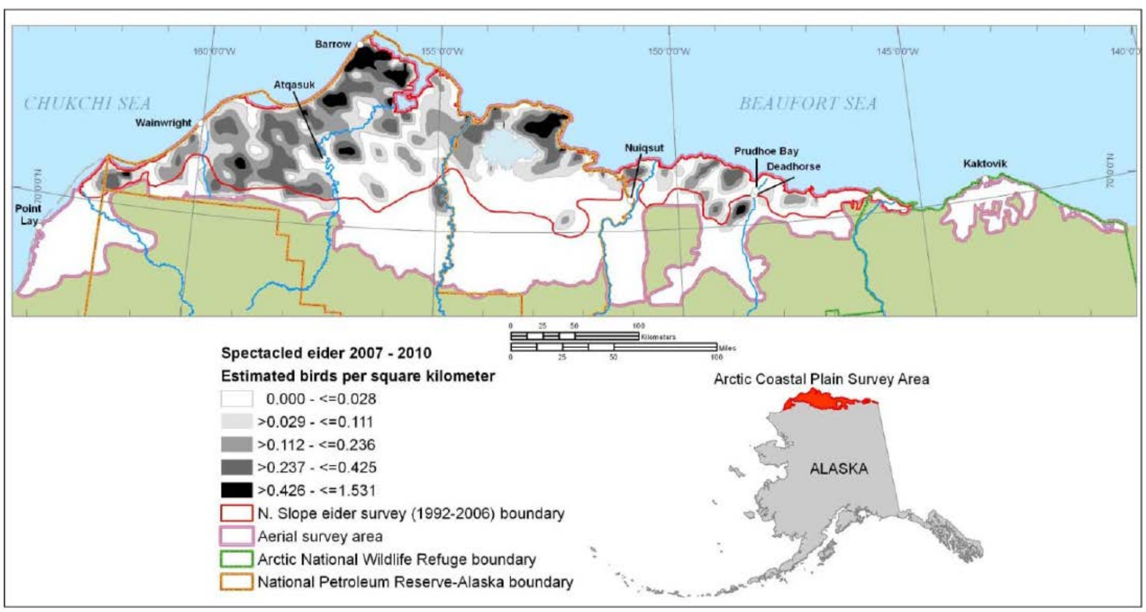

Figure 3.2. Density distribution of spectacled eiders observed on aerial transects sampling 57,336 km^2 of wetland tundra on the North Slope of Alaska during early to mid-June, 2007–2010 (Larned et al. 2011).

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 (Petersen 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 (Petersen et al. 1999, TERA 2002). Recent telemetry data indicates that molt migration of failed/non-breeding females from the Colville River Delta through the Beaufort Sea is relatively rapid, 2– weeks, compared to 2–3 months spent in the Chukchi Sea (Matt Sexson, USGS, pers. comm.).

Spectacled eiders use specific molting areas from July to late October/early November. Larned et al. (1995) and Petersen 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 3.2). Females generally used molting areas nearest their breeding grounds. All marked females from the YKD molted in nearby Norton Sound, while females from the North Slope molted in Ledyard Bay, along the Russian coast, and near St. Lawrence Island. 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 through late September and remained through October. Fledged juveniles marked on the Colville River Delta usually staged in the Beaufort Sea near the delta for 2–3 weeks before migrating to the Chukchi Sea.

Table 3.2. Important molting areas for female and male spectacled eiders from each breeding population.

Population and Sex	**Molting Area**
Arctic Russia males	Indigirka-Kolyma Delta Area
	Mechigmenskiy Bay
	Ledyard Bay
Arctic Russia females	unknown
North Slope males	Ledyard Bay
	Indigirka-Kolyma Delta Area
	Mechigmenskiy Bay
North Slope females	Ledyard Bay
	Mechigmenskiy Bay
Yukon–Kuskokwim Delta males	Mechigmenskiy Bay Eastern Norton Sound Indigirka-Kolyma Delta Area
Yukon–Kuskokwim Delta females	Eastern Norton Sound

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 – Spectacled eiders generally depart all molting sites in late October/early November (Matt Sexson, USGS, pers. comm.), migrating 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 3.9B). In this relatively shallow area, > 300,000 spectacled eiders (Petersen et al. 1999) rest and feed, diving up to 70 m to eat bivalves, other mollusks, and crustaceans (Cottam 1939, Petersen et al. 1998, Lovvorn et al. 2003, Petersen and Douglas 2004).

Spring migration – Recent information about spectacled and other eiders indicates 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 3.11; USGS, unpublished data) suggest that spectacled eiders also use the lead system during spring migration.

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 primarily off 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.

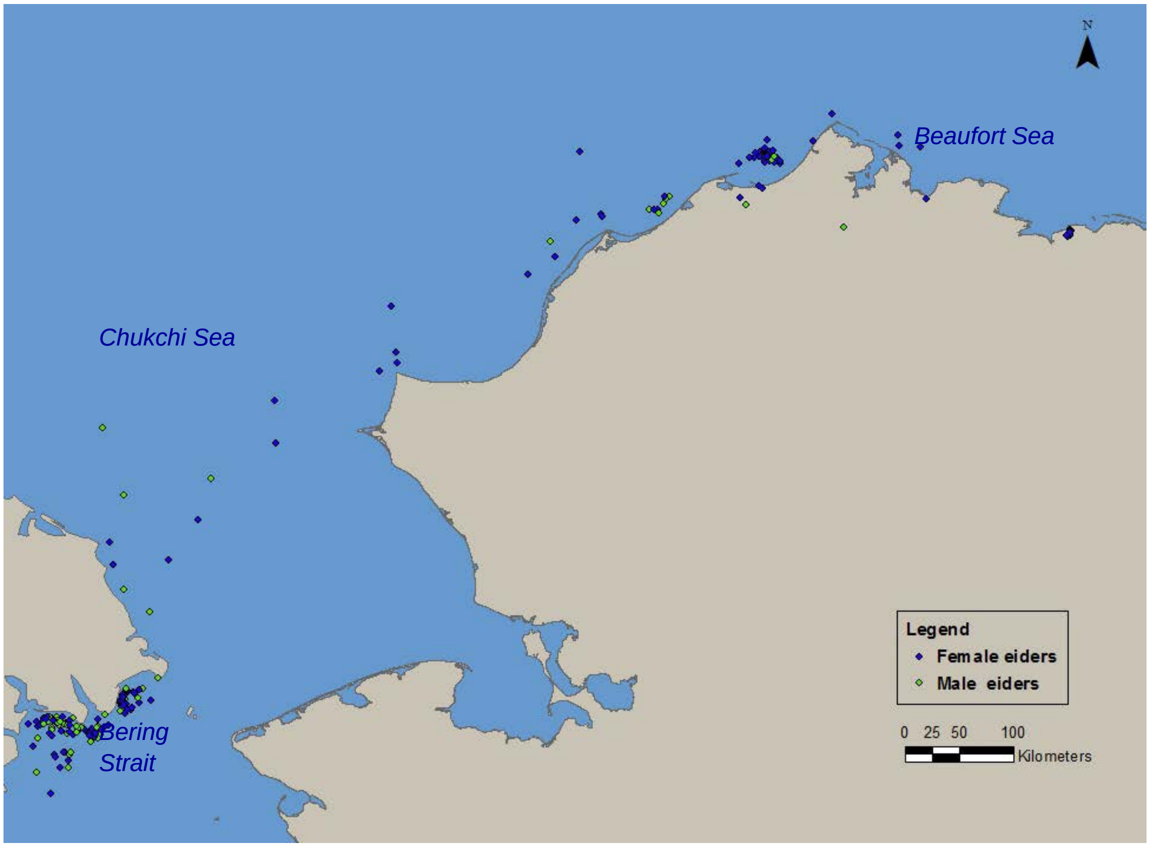

Figure 3.3. Spectacled eider satellite telemetry locations for 12 female and 7 male spectacled eiders in the eastern Chukchi Sea from 1 April – 15 June 2010 and 1 April – 15 June 2011. Additional locations from the northern coast of Russia are not shown. Eiders were tagged on the North Slope during the 2009 and 2010 breeding seasons. Data provided by Matt Sexson, USGS Alaska Science Center (USGS, unpublished).

Abundance and trends

The most recent rangewide estimate of spectacled eider population size was 369,122 ± 4,932 90% CI, obtained from aerial surveys of the known wintering area in the northern Bering Sea south of St. Lawrence Island, Alaska in late winter 2010 (Larned et al. 2012). Fewer birds were documented in the wintering area in 2009 (305,261 ± 2,977 90% CI); however, satellite telemetry and other survey data indicated the survey may have been timed late relative to the beginning of spring migration (Larned et al. 2012). Comparison of the appropriately timed 2010 estimate (369,122) to the results of similar aerial surveys in 1997 (363,030 eiders) and 1998 (374,792 eiders) suggests a stable global wintering population (Larned et al. 2012).

Population indices for North Slope-breeding spectacled eiders are unavailable prior to 1992. However, Warnock and Troy (1992) documented an 80% decline in spectacled eider abundance from 1981 to 1991 in the Prudhoe Bay area. Since 1992, the Service has conducted annual aerial surveys for breeding spectacled eiders on the ACP. The 2010 population index based on these aerial surveys was 6,286 birds (95% CI, 4,877–7,695; unadjusted for detection probability), which is 4% lower than the 18-year mean (Larned et al. 2011). In 2010, the index growth rate was significantly negative for both the long-term (0.987; 95% CI, 0.974–0.999) and most recent 10 years (0.974; 95% CI, 0.950–0.999; Larned et al. 2011). Stehn et al. (2006) developed a North Slope-breeding population estimate of 12,916 (95% CI, 10,942–14,890) based on the 2002–2006 ACP aerial index for spectacled eiders and relationships between ground and aerial surveys on the YKD. If the same methods are applied to the 2007–2010 ACP aerial index reported in Larned et al. (2011), the resulting North Slope-breeding population estimate is 11,254 (8,338–14,167, 95% CI).

The YKD spectacled eider population was thought to be about 4% of historic levels in 1992 (Stehn et al. 1993). Evidence of the dramatic decline in spectacled eider nesting on the YKD 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 YKD declined from 48,000 to 2,000, apparently stabilizing at that low level (Stehn et al. 1993). Before 1972, an estimated 47,700–70,000 pairs of spectacled eiders nested on the YKD in average to good years (Dau and Kistchinski 1977).

Fischer et al. (2011) used combined annual ground-based and aerial survey data to estimate the number of nests and eggs of spectacled eiders on the coastal area of the YKD in 2011 and evaluate long-term trends in the YKD breeding population from 1985 to 2011. The estimated total number of nests measures the minimum number of breeding pairs in the population in a given year and does not include potential breeders that did not establish nests that year or nests that were destroyed or abandoned at an early stage (Fischer et al. 2011). The total number of nests in 2011 was estimated at 3,608 (SE 448) spectacled eiders nests on the YKD, the second lowest estimate over the past 10 years. The average population growth rate based on these surveys was 1.049 (90% CI = 0.994–1.105) in 2002–2011 and 1.003 (90% CI = 0.991–1.015) in 1985–2011 (Fischer et al. 2011). Log-linear regression based solely on the long-term YKD aerial survey data indicate positive population growth rates of 1.073 (90% CI = 1.046–1.100) in 2001–2010 and 1.070 (90% CI = 1.058–1.081) in 1988–2010 (Platte and Stehn 2011). The 2010 population index based on these aerial surveys was 5362 birds (SE 527). Platte and Stehn (2011) estimated the YKD spectacled eider breeding population to be 12,601 (95% CI[1] = 10,173–15,028) in 2010.

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 ESA 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 YKD (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. Under the Recovery Plan, the species will be considered recovered when each of the three recognized populations (YKD, North Slope of Alaska, and Arctic Russia): 1) is stable or increasing over 10 or more years and the minimum

[1] Confidence intervals calculated based on information provided in Platte and Stehn (2011).

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.

6. ENVIRONMENTAL BASELINE

The environmental baseline, as described in section 7 regulations (50 CFR §402.02) includes the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The environmental baseline provides the context within which the effects of the Action will be analyzed and evaluated.

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.

Status of Spectacled Eiders within the Action Area

The Prudhoe/Kuparuk area is one of the primary breeding areas along the Beaufort Coast (Figure 4.1; Larned et al. 2011). Spectacled eiders are present in the Action Area from late May through late October. The factors that have potentially contributed to the current status of spectacled eiders in the Action Area are discussed below and include environmental contaminants, increased predation, collisions with structures, and long-term habitat loss through development and disturbance.

Environmental Contaminants

The deposition of lead shot in tundra or nearshore habitats used for foraging is considered a threat to spectacled 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; A. Matz, USFWS, unpublished data), and six of the seven tested had blood lead concentrations that indicated poisoning (>0.5 ppm lead; Franson and Pain 2011). 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 (A. Matz, USFWS, unpublished data). Use of lead shot for hunting waterfowl is prohibited statewide, and for hunting all birds on the North Slope, and the Service reports good compliance in most areas with the lead shot prohibitions. Further, we expect the availability of lead shot in spectacled eider foraging habitat near Prudhoe Bay to be substantially lower than areas of the North Slope used more frequently for waterfowl hunting.

Other contaminants, including petroleum hydrocarbons from local sources and globally distributed heavy metals, may also affect spectacled eiders. For example, Trust et al. (2000) reported high concentrations of metals and subtle biochemical changes in spectacled eiders wintering near St. Lawrence Island. Spectacled eiders breeding in the Prudhoe Bay area may have experienced varying levels of exposure to petroleum hydrocarbons, heavy metals, and other contaminants; however, it is difficult to assess the impacts of this exposure to eiders.

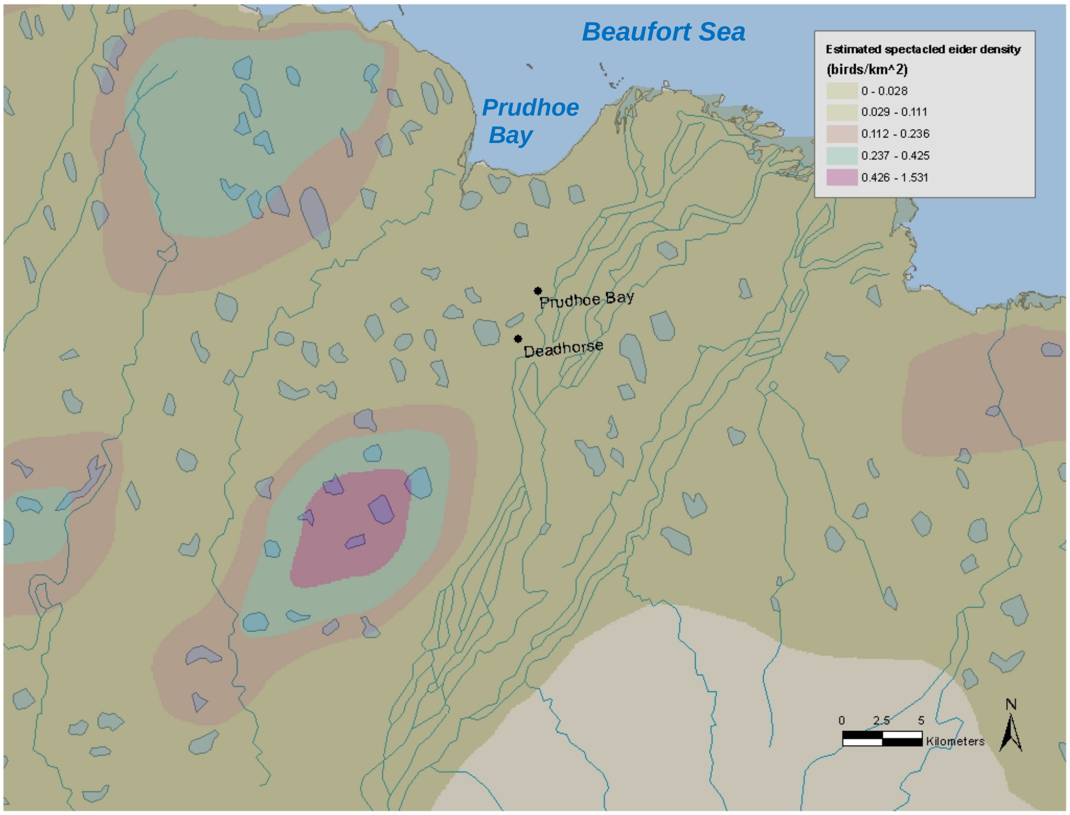

Figure 4.1. Estimated spectacled eider density in the vicinity of Prudhoe Bay. Density polygons are based on data collected during the 2007–2010 Arctic Coastal Plain aerial surveys (USFWS Migratory Bird Management, unpublished data).

Increased Predator Populations

There is some evidence that predator and scavenger populations have increased on the ACP near villages and industrial infrastructure (Eberhardt et al. 1983; Day 1998; Powell and Bakensto 2009). Researchers have proposed that reduced fox trapping, anthropogenic food sources in villages and oil fields, and nesting/denning sites on human-built structures have resulted in increased fox, gull, and raven numbers (R. Suydam and D. Troy, pers. comm. in USFWS 2010, Day 1998). Although we expect corresponding increases in predation rates have also occurred, studies to substantiate the influence of increased predation on spectacled eiders are lacking. However, studies of Steller's eiders near Barrow have suggested a relationship between predation rates and breeding success (Quakenbush et al. 1995, Obritschkewitsch et al. 2001, Rojek 2008, Safine 2011).

Extensive oil and gas development within the East and West Operating Areas of the Prudhoe Bay Unit since the 1970s may have influenced predator populations in the Action Area.

Although efforts by industry to manage food waste and discourage nesting on infrastructure have mitigated increases in predator population to an extent, it is likely that spectacled eiders have experienced increased predation rates associated with development in the Prudhoe Bay area.

Habitat Loss through Development and Disturbance

Existing oil and gas industry developments in the Prudhoe Bay Unit have resulted in long-term loss of spectacled eider breeding habitat in the Action Area directly through gravel fill and in directly through disturbance from oilfield activities. Given the extent of development in the Prudhoe Bay area, it is likely that eiders have experienced loss of production resulting from direct and indirect habitat loss. However, the degree to which spectacled eiders can reproduce in disturbed areas or move to other less disturbed areas to reproduce, and the potential population level consequences of previous development in the Action Area, are unknown.

Climate Change

Arctic landscapes are dominated by lakes and ponds (Quinlan et al. 2005), such as those used by spectacled eiders for feeding and brood rearing on Alaska's North Slope. Arctic regions 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). Productivity of some lakes and ponds appears to have increased as a result of nutrient inputs from thawing soil and increased annual 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 regimes have also altered the algal and invertebrate communities that form the basis of the food web in these systems (Smol et al. 2005, Quinlan et al. 2005) and may have resulted in mismatched timing between migration and the availability of food in Arctic ponds (Callaghan et al. 2004).

Our analyses of the effects of the Proposed Action on species listed under the ESA include consideration of ongoing and projected changes in climate. The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). "Climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

Regional Activities Requiring Formal Section 7 Consultation

Activities on the eastern ACP that required formal section 7 consultations, and the estimated incidental take of listed eiders, is presented in Table 4.1. The table illustrates the number and diversity of actions that required consultation in the region. 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 30–50 years), and is dominated by the potential loss of eggs/ducklings, which we expect to have substantially lower population-level effects compared to adult mortality for this species (see further discussion in the conclusion).

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

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 Ooguruk 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	Loss of Production	130 spectacled eider eggs/ducklings

Beaufort Seas (2009; North Slope field sites)	Capture/surgery	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 spectacled eiders (lethal take) 4 adult Steller's 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)
ConocoPhillips Alaska, Inc's CD-5 Project (Alpine reinitiation; 2011)	Habitat loss	59 spectacled eider eggs/ducklings
Pioneer Natural Resources, Inc.'s Nuna Project (2012)	Habitat loss	114 spectacled eider eggs/ducklings
Intra-Service, Migratory Bird Subsistence Hunting Regulations (2012)	Shooting	400 adult spectacled eiders (lethal take) 4 adult Steller's eiders (lethal take)

7. EFFECTS OF THE ACTION ON SPECTACLED EIDERS

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.

Investigator disturbance during proposed field activities could adversely impact spectacled eiders by: 1) displacing adults and/or broods from preferred habitats during pre-nesting, nesting, and brood rearing; 2) displacing females from nests, exposing eggs or small young to inclement weather or predators; and 3) reducing foraging efficiency and feeding time. The results of published studies on the impacts of human disturbance to nesting waterfowl are variable but suggest low to moderate effects on nest survival and rates of nest abandonment. For example, data from the YKD indicates that nest disturbance from human activity results in decreases in spectacled eider nest survival rate of 4% (Bowman and Stehn 2003), and 14% (Grand and Flint 1997); very low rates of desertion, 0.8% naturally with an additional 0.7% as a result of human disturbance, were reported from studies of cackling geese and spectacled eiders on the YKD (Mickleson 1975); and Johnson (1984) documented several nests abandoned by female common eiders after human disturbance on Thetis Island, northern Alaska. However, individual tolerance and behavioral response of spectacled eiders to disturbance likely varies and the effects of repeated visits by investigators to field sites near spectacled eider nests are unknown.

Predation is important mechanism through which human disturbance may affect nesting success. In a review of the effects of field observers on nesting success of common eiders, Götmark (1992) found that 76% of studies that reported reduced nest success identified predation as the primary cause. While both avian and mammalian predators have been documented depredating nests after a hen has been flushed by humans, Götmark (1992) concluded that avian predators were most likely to have an effect as a result of disturbance. Grand and Flint (1997) suggested avian predators, particularly gulls, were more prevalent than mammalian predators on the YKD. Similar results were reported from studies in the area by Mickelson (1975) who attributed 85.9% of nest predation to avian predators, while Vacca and Handel (1988) attributed 78% of predation to avian predators. Given the similar fauna, vegetation, and terrain it is possible that avian predators would also be more significant than mammalian predators if nests are disturbed on the ACP. Safine (2011) reported depredation of a camera-monitored nest by glaucus gulls and parasitic jaegers after a spectacled eider delayed returning to incubate the nest following capture by investigators. However, arctic foxes were also responsible for a substantial portion of nest depredation observed in camera-monitoring studies of waterfowl nests in the Barrow area (Safine 2011) and shorebird and passerine nests in the Prudhoe Bay region of the ACP (Liebezeit and Zack 2008). Investigator disturbance may also fragment young broods or separate hens from ducklings, making the ducklings more vulnerable to predators.

Breeding spectacled eiders that within or near study area are likely to experience investigators walking near their nest up to several times during nest initiation and incubation periods. Although the WCS has not encountered spectacled eider nests over the past seven years of research in the long-term nest plots, breeding pairs have been observed in the vicinity of some plots (USFWS, unpublished data) and the footprint of the total affected area of tundra from the 3 proposed studies in 2012 and 2013 is considerably larger than that of the long-term nest plots alone. We expect the Proposed Action would affect listed eiders nesting within study plots and within a 200-m zone of influence surrounding field activities where the reproductive success of eiders occupying otherwise suitable habitat may be compromised by disturbance. We estimate the total affected area encompasses approximately 9.8 km^2 of tundra. Hiking paths were not included in our estimate of affected area because researchers will remain ≥ 200 m from known nests along these paths and we do not expect a single flush event associated with initial discovery of a nest to result in take.

Spectacled eider density polygons constructed from the 2007–2010 waterfowl breeding population survey of the Arctic Coastal Plain, Alaska (ACP survey; Larned et al. 2011) provide our best estimates of spectacled eider nesting in the project area. We used the median of the spectacled eider density range for each long-term plot and transect (0.014, 0.07, 0.174, or 0.331 birds/km^2) and the median for the overall density range in the Action Area for rehabilitated study sites (0.2125 birds/km^2). We divided densities of individuals by two to estimate the density of breeding pairs. We estimated the potential number of spectacled eider nests lost by multiplying the estimated number of breeding pairs by the extent of the affected area.

For the purpose of quantifying the effects of investigator disturbance on spectacled eiders, we assume these effects result in the loss of production of an estimated number of eggs or ducklings. To estimate loss of production, we first estimate the number of potentially affected eider nests by multiplying the estimated density of spectacled eiders by 0.5 nests per bird and by the extent of the affected area. Calculations were applied incrementally for each study area as described below. We then multiply the estimated number of nests in the Action Area by mean clutch size to estimate the potential number of spectacled eider eggs or ducklings lost each field season.

Long-term Nest Monitoring

Activities in the 12 nest plots would affect eiders nesting in 0.67 km^2 per plot (total area = 2.67 km^2). The number of nests in and within 200 m of the long-term plots was calculated separately for each of the 4 different spectacled eider densities occurring in the study area:

4 plots × 0.67 km^2/plot × 0.014 birds/km^2 × 0.5 nests/bird = 0.019 nests

2 plots × 0.67 km^2/plot × 0.07 birds/km^2 × 0.5 nests/bird = 0.047 nests

2 plots × 0.67 km^2/plot × 0.174 birds/km^2 × 0.5 nests/bird = 0.12 nests

4 plots × 0.67 km^2/plot × 0.331 birds/km^2 × 0.5 nests/bird = 0.44 nests

Thus, the total number of affected nests potentially encountered per season is 0.62.

Artificial Nest Experiment

Activities along the 9 transects would affect eiders nesting in 1.33 km^2 per transect (total area = 3.98 km^2). The number of nests within 200 m of transects was calculated separately for each of the 3 different spectacled eider densities occurring in the study area:

6 plots × 1.33 km^2/plot × 0.014 birds/km^2 × 0.5 nests/bird = 0.056 nests

2 plots × 1.33 km^2/plot × 0.174 birds/km^2 × 0.5 nests/bird = 0.23 nests

1 plots × 1.33 km^2/plot × 0.331 birds/km^2 × 0.5 nests/bird = 0.22 nests

Thus, the total number of affected nests potentially encountered per season is 0.51.

Bird Use of Rehabilitated Oilfield Pads

The 12 rehabilitated sites would vary in shape and size. We estimated the extent of the affected area by assuming a square shape for each of the 12 currently proposed sites, resulting in estimates of 0.23–0.39 km^2 per site (total area = 3.48 km^2). The number of nests potentially affected within a 200-m zone of influence surrounding each site was calculated using the mean spectacled eider density for the Action Area, 0.2125 birds/km^2. The resulting total number of potentially affected nests is 0.37.

Total Loss of Production

Based on the calculation described above, we estimated a total of 2 spectacled eider nests may be encountered each field season from the three proposed studies (0.62 + 0.51 + 0.37 = 1.50). However, we expect the conservation measures proposed by WCS, specifically to remain ≥100 m from known spectacled eider nests, would greatly reduce the risk of adverse effects. Accordingly, we do not expect more than one nest would be lost each field season during proposed activities. We estimate loss of production from a single nest to be 4 spectacled eider eggs or ducklings based on an average clutch size[2] of 3.9.

Interrelated and Interdependent Actions

Interdependent actions are defined as "actions having no independent utility apart for the Proposed Action," while interrelated actions are defined as "actions that are part of a larger action and depend upon the larger action for their justification" (50 CFR §402.02). The Service has not identified any actions that are interrelated or interdependent to the Proposed Action. Similar research proposed by WCS in the National Petroleum Reserve-Alaska west of the Action Area and research at other ASDN sites are not dependent on the ASDN for their justification (they are not interrelated actions) and have independent utility apart from the Proposed Action (they are not interdependent actions).

Summary

The frequency of investigator activity in the Action Area during nest searching, return visits to shorebird and passerine nests, and other field activities can be expected to increase the risk of adverse effects to listed eiders in terms of loss of production, which may occur through abandonment of the nest; full or partial depredation of an unattended nest; or depredation of ducklings associated with fragmented broods. However, conservation measure requiring field crews to remain ≥100 m from known spectacled eider nests would greatly reduce the risk of adverse effects. Using the methods described above, we have estimated that loss of production

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[2] Average clutch size for spectacled eiders in northern Alaska is estimated as 3.9 based on results of Petersen et. al. 2000, Bart and Earnst 2005, and Johnson et al. 2008.

of up to 4 spectacled eider eggs or ducklings in each of the two field seasons may result from the Proposed Action.

8. 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 Act. 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.

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

Additional scientific research is likely to occur in the Action Area. We anticipate that most research would involve a Federal action agency through funding or permitting of those activities. While there is the possibility future scientific research may occur in the Action Area that does not require consultation under the ESA, we have determined that such research is not reasonably certain to occur.

9. CONCLUSION

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."

In evaluating the impacts of the proposed project to listed eiders, the Service identified direct and indirect adverse effects that could result from habitat loss and disturbance. Using methods and logic explained in the *Effects of the Action* section, the Service estimates 8 spectacled eider eggs or ducklings (2 spectacled eider nests) may be lost through investigator disturbance over the two field seasons (2012 and 2013).

Only a small proportion of eider eggs or ducklings would eventually survive to recruit into the breeding populations. For example, spectacled eider nest success recorded on the YKD ranged from 18-73% (Grand and Flint 1997). 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 that 0.9–6.6% of eggs/ducklings would be expected to survive and recruit into the breeding population. Thus, the loss of eggs or ducklings is of lower significance for survival and recovery of listed eiders than the death of an adult bird. If we also apply these rates to the estimated loss of production for the Proposed Action for both listed eiders, we would expect the project to preclude 0.07–0.53 adult spectacled eiders from entering the breeding populations over the two years of research in the Prudhoe Bay oilfields.

Because the potential loss of eider recruitment is very small relative to the size of the North Slope breeding population[3], we believe the Proposed Action will not have significant population–level effects and will not affect the likelihood of survival and recovery of spectacled eiders. Accordingly, it is the Services' biological opinion that the Proposed Action is not likely to jeopardize the continued existence of spectacled eiders.

This BO's determination of non-jeopardy is based on the assumption that USFWS MBM and their agents will consult with the USFWS Endangered Species Program on any future activities related to the Proposed Action that are not evaluated in this document.

In addition to listed eiders and polar bears, the area affected by the Proposed Action 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 Federal action agencies 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.

10. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA 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

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[3] Applying the methods of Stehn et al. (2006) to more recent aerial survey data from the North Slope results in an estimate of 11,254 (8,338–14,167, 95% CI) for the period of 2007–2010.

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).

Adverse effects to listed eiders have been substantially reduced through implementation of conservation measures by WCS, as described in the Proposed Action section. However, the Service still anticipates some adverse effects to 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 investigator disturbance. Methods used to estimate loss of eider production are described in the *Effects of the Action* section. The Service anticipates that *8 spectacled eider eggs or ducklings* are likely to be taken over two years as a result of the Proposed Action through the effects of disturbance (harm).

While the incidental take statement provided in this consultation satisfies the requirements of the Act, 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.

The measures described below are non-discretionary, and must be undertaken/required by USFWS MBM 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. MBM has a continuing duty to regulate the activity covered by this ITS. If MBM should (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.

11. REASONABLE AND PRUDENT MEASURES

These reasonable and prudent measures (RPMs) and their implementing terms and conditions (T&Cs) aim to minimize the incidental take anticipated from activities described in this BO.

RPM 1 **–** Field crews should avoid flushing female spectacled eiders that are detected and identified during proposed activities.

RPM 2 **–** If a known or potential spectacled eider nest is discovered by inadvertently flushing the hen from the nest or an unattended nest is found, the eggs should be covered with down to reduce the risk of depredation and field crews should leave the nest area as a soon as practicable.

RPM 3 **–** To increase our understanding of the impact of disturbance on breeding spectacled eiders, the location of spectacled eiders or their nests and observed responses of these birds should be reported.

12. TERMS AND CONDITIONS

To be exempt from the prohibitions of Section 9 of the ESA, the WCS and USFWS must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

T&C 1 – If field crews detect a spectacled eider female on a nest, they shall immediately back away from the nest until they are ~30 m from the female, record the GPS coordinates of the nest and the distance and direction from the GPS point to the nest (i.e., nest is 30 m N of waypoint), and leave the nest area as quickly as possible. Follow the conservation measures described in the Proposed Action section for subsequent visits to the nest area.

T&C 2 – If field crews flush a spectacled eider hen from her nest or an unattended spectacled eider nest is found, field crews shall carefully cover the eggs with some of the loose down from the edge of the nest bowl, following all pertinent health and safety guidelines. If no down is present (nest in laying stage), use the loose vegetation from the edge of the nest bowl to cover the eggs. Be careful not to damage the nest in the process. The goal is to obscure the eggs from avian predators, as this is the normal way a female will leave a nest when on a nest break that is not caused by humans. This is very important to keep the eggs warm and reduce predation. Crews should record the GPS coordinates of the nest and leave the nest area as quickly as possible to allow the hen to return. Use the same procedure for potential spectacled eider nests that cannot be identified to species. Follow the conservation measures described in the Proposed Action section for subsequent visits to the nest area.

T&C 3 – Any observations of spectacled eiders, or their nests, shall be provided to the Endangered Species Branch of the Fairbanks Fish and Wildlife Field Office by September 1 following each field season. Information shall include the GPS coordinates of the nest (latitude and longitude with datum, i.e., NAD 83 or WGS84), date of observation, and a brief description of any observed behavior (e.g., a hen flushed when 2 field crew members were approximately 50 m from the nest).

13. REINITIATION NOTICE

This concludes formal consultation for the WCS 2012 and 2013 avian field studies near Prudhoe Bay, AK. 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.

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