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
April 8, 2011

MEMORANDUM

To: **Julian Fischer, Project Leader, USFWS Anchorage Waterfowl Management Field Office**

From: **Ted Swem, Endangered Species Branch Chief** Ted Swem

Subject: **Biological Opinion: Migratory Bird Management's Project Greater White-fronted Goose Banding, North Slope of Alaska, 2011**

This memorandum is in response to your request for formal consultation regarding effects of USFWS Migratory Bird Management's project entitled *Greater White-fronted Goose Banding, North Slope of Alaska, 2011* on endangered and threatened species and critical habitats pursuant to Section 7 of the Endangered Species Act of 1973, as amended. Please find attached the Biological Opinion (BO) where we have concluded that the level of anticipated take is not likely to jeopardize the continued existence of listed species and is not likely to destroy or adversely modify designated critical habitat. Reasonable and prudent measures, terms and conditions, and reporting requirements for this project are outlined within the BO.

If you have further questions, please call Denise Walther at 907-456-0277.

INTRA-SERVICE BIOLOGICAL OPINION

for

Greater White-fronted Goose Banding, North Slope of Alaska, 2011

Consultation with the
U.S. Fish and Wildlife Service – Migratory Birds
Anchorage, Alaska

Prepared by:
Fairbanks Fish and Wildlife Field Office
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101 12th Ave, Room 110
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April 7, 2011

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1. INTRODUCTION

This document is the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) on a proposal by the Service's Migratory Bird Management (MBM) Office to conduct survival monitoring of greater white-fronted geese (*Anser albifrons frontalis*) on the western North Slope in summer 2011. This BO describes the effects of these actions on Steller's (*Polysticta stelleri*) and spectacled eiders (*Somateria fischeri*), and polar bear (*Ursus maritimus*) pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). There is no designated critical habitat within the Action Area.

Final project details were received on March 7, 2011, and formal consultation began on that date. The complete administrative record for this consultation is on file at the Service's Fairbanks Fish and Wildlife Field Office.

Migratory Bird Management proposes to capture midcontinent greater white-fronted geese for leg-band survival studies, in the Northwest National Petroleum Reserve-Alaska (NPR-A), July 10–16, 2011. Leg banding is the tool needed to measure annual survival rates and identify migratory routes and harvest distribution. An annual sample of 1,000 banded white-fronted geese on the Arctic Coastal Plain of Alaska is needed for 10 years to ensure a 90% chance of detecting a 5% difference in survival rate.

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

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

We anticipate that the probability of encountering polar bear (*Ursus maritimus*) during the project will be very low because the proposed study sites are located ≥20 miles inland from the coast, field work will be limited to 7 days in July 2011, and there will be no field camp. Additionally, MBM will follow Polar Bear Interaction Guidelines (Appendix 1) developed in cooperation with the Service's Marine Mammals Management Office. Implementation of these guidelines should further minimize the risk of polar bear/human interactions. Based on the low probability of a human–polar bear interaction in the Action Area and the implementation Polar Bear Interaction Guidelines, the Service concludes that the project is not likely to adversely affect polar bears and there will be no further treatment of the species in this document.

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 listed eiders but will not jeopardize the continued existence of either species. To arrive at this non-jeopardy determination, we used a four-step approach for applying section 7(a)(2) standards. These steps were:

1. Define the biological requirements and current status of listed eiders;

2. Evaluate the relevance of the environmental baseline to the current status of listed eider populations;
3. Determine the effects of the proposed or continuing action on the species; and
4. Determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects.

2. DESCRIPTION OF THE PROPOSED ACTION

2.1 Background

Section 7(a)(2) of the Endangered Species Act, (16 U.S.C. § 1531 et seq.), requires that Federal agencies shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat. When the actions of a Federal agency may adversely affect a protected species, that agency (i.e., the action agency) is required to consult with either the National Marine Fisheries Service (NMFS) or the Service, depending upon the protected species that may be affected.

For the actions described in this document, the action agency is the Migratory Bird Management Office (MBM Office) of the U.S. Fish and Wildlife Service – Region 7. This consultation is being conducted as an intra-service consultation with the Endangered Species Branch of the Fairbanks Fish and Wildlife Field Office.

2.2 Action Area

The action area is that area in which the direct and indirect effects of the proposed action may occur.

Five proposed banding locations have been identified on lakes within the Northwest National Petroleum Reserve-Alaska (NW NPR-A) within approximately 30 miles of Atqasuk, AK (Figure 2.1). Actual banding sites may be relocated to adjoining lakes based on the distribution of molting greater white-fronted geese in July 2011. Work at each station is anticipated to disturb an area of approximately one square mile (2.59 km^2; Fischer, *pers. comm.)*. The banding stations and their immediate surroundings are the action area for this portion of the study.

2.3 Project Actions

The objective of this study is to mark a total of 1,000 geese with USFWS leg bands. The project will take place from approximately July 10–16, 2011. Banding operations will involve transport of eight individuals from Atqasuk, AK to each of five banding sites (Figure 2.1) via amphibious single-engine aircraft (float planes). Concentrations of molting geese will be located on selected inland lakes through aerial reconnaissance. Float planes will land and slowly herd flocks towards nets on shore. When geese are on shore, field crews will corral the flocks into a large holding pen, at which point banding will commence. Field crews of 8 individuals will mark a total of 1,000 geese with USFWS leg bands. Banded geese will be immediately released onsite. All field personnel will be lodged at Atqasuk, Alaska; there will be no field camps. All aviation fuel will obtained from a USFWS fuel tank in Atqasuk.

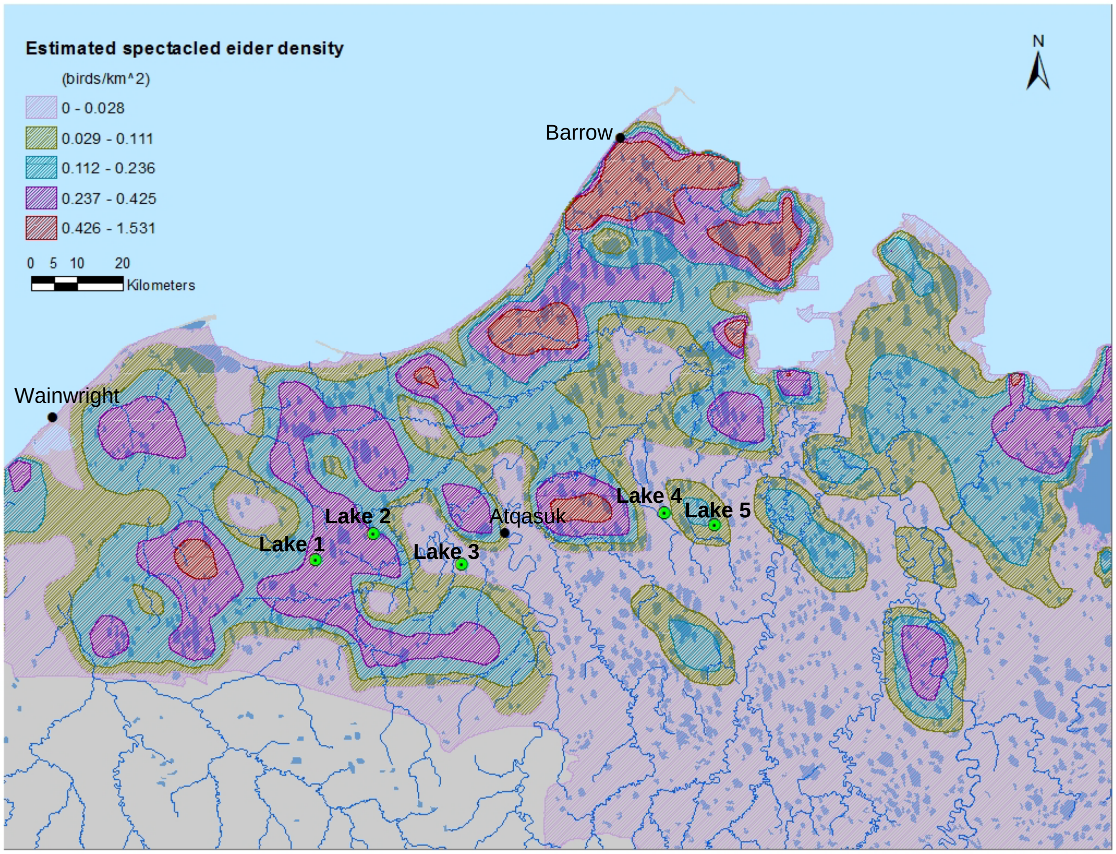

Figure 2.1. Proposed locations for greater white-fronted goose capture and banding July 10–16, 2011. Spectacled eider densities polygons are based on the 2007–2010 Arctic Coastal Plain aerial survey data (USFWS Migratory Bird Management, unpublished data).

3. STATUS OF THE SPECIES

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

3.1 Steller's Eider

Physical Appearance

The Steller's eider is the smallest of the four eider species. From early winter until mid-summer males are in breeding plumage - black back, white shoulders and sides, chestnut breast, white head with black eye patches and a greenish tuft (Figure 3.1). During late summer and fall, males molt to dark brown with a white-bordered blue wing speculum; this plumage is replaced during the autumn molt when males re-acquire breeding plumage, which lasts through the next summer. Females are dark mottled brown with a blue wing speculum year round. Juveniles are dark mottled brown until the fall of their second year, when they acquire breeding plumage (Fredrickson 2001).

Figure 3.1 - Male and female Steller's eider in breeding plumage.

Status and Distribution

The Steller's eider is a sea duck with a circumpolar distribution. Steller's eiders are divided into Atlantic and Pacific populations; the Pacific population is further divided into the Russia-breeding population along the Russian eastern arctic coastal plain, and the Alaska-breeding population. On June 11, 1997, the Alaska-breeding population of Steller's eiders was listed as threatened based on a substantial decrease in this population's breeding range and the increased vulnerability of the remaining Alaska-breeding population to extirpation (USFWS 1997). Although population size estimates for the Alaska-breeding population were imprecise, it was clear Steller's eiders had essentially disappeared as a breeding species from the Yukon-Kuskokwim Delta (Y-K Delta), where they had historically occurred in significant numbers, and that their Arctic Coastal Plain (North Slope) breeding range was much reduced. On the North Slope they historically occurred east to the Canada border (Brooks 1915), but have not been observed on the eastern North Slope in recent decades (USFWS 2002). The Alaska-breeding population of Steller's eiders now nests primarily on the North Slope, particularly near Barrow and at very low densities from Wainwright to at least as far east as Prudhoe Bay (Figure 3.2). A few pairs may still nest on the Y-K Delta; only 10

Steller's eider nests have been recorded on the Y-K Delta since 1970 (Hollmen et al. 2007).

Life History – North Slope (Breeding)
Steller's eiders arrive in pairs on Alaska's North Slope in early June, but nests are only found intermittently near Barrow since 1991. Nests of Steller's eiders have been found near Barrow in 12 (60%) of the last 20 years. (USFWS, unpublished data). Individuals foregoing breeding is common in long-lived eider species and is typically related to inadequate body condition (Coulson 1984), but reasons for Steller's eiders non-breeding may be more complex. In the Barrow area, Steller's eider nesting is correlated with lemming numbers and other environmental cues; nest success could be enhanced in years of lemming abundance because nest predators are less likely to prey-switch to eider eggs and young, or because avian predators such as pomarine jaegers (*Stercorarius pomarinus*) and snowy owls (*Bubo scandiaca*) that nest nearby (and consume abundant lemmings) may protect eider nests from mammalian predators such as arctic fox (Quakenbush and Suydam 1999, and summarized by Rojek 2006).

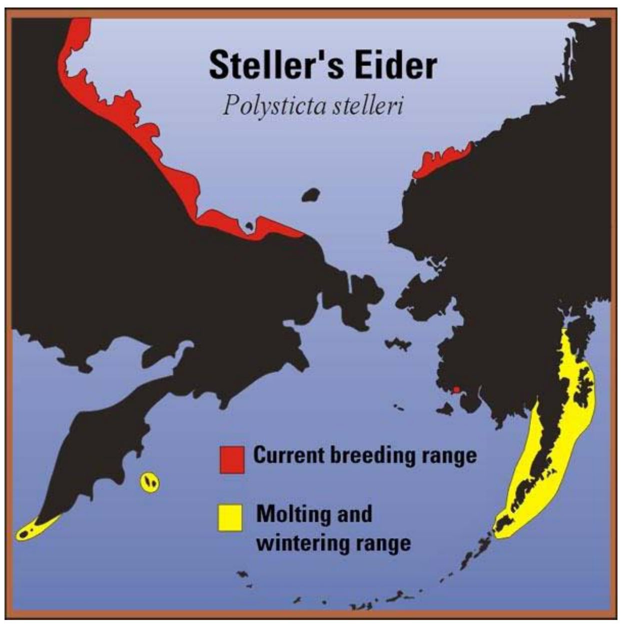

Figure 3.2 - Steller's eider distribution in the Bering, Beaufort and Chukchi seas

When they do nest, Alaska-breeding Steller's eiders use coastal tundra adjacent to small ponds or within drained lake basins, occasionally as far as 90 km inland. Nests are initiated in the first half of June (Quakenbush et al. 1995), and hatching occurs from July 7 to August 3 (Quakenbush et al. 1998). Nests located in the vicinity of Barrow were in wet tundra, in drained lake basins or low-center or low indistinct flat-centered polygon areas (Quakenbush et al. 1998). Average clutch sizes at Barrow varied from 5.3-6.3, with clutches of up to 8 reported (Quakenbush et al. 1998). Nest survival (the probability a nest will hatch at least one egg) averaged 0.23 in nesting years (1991-2004) prior to fox control, whereas nest survival during nesting years after fox control began (2005–2010) was 0.48 (USFWS, unpublished data).

As with spectacled eiders, nest and egg loss was attributed to predation by jaegers, common raven (*Corvus corax*), arctic fox, and possibly glaucous gulls (*Larus hyperboreus*) (Quakenbush et al. 1995, Obritschkewitsch et al. 2001).

Within a day or two after hatch, hens move their broods to adjacent ponds with emergent vegetation, particularly *Carex* spp. and *Arctophila fulva* (Quakenbush et al. 1998, Rojek 2006, 2007) Here they feed on insect larvae and other wetland invertebrates. Broods may move up to several kilometers from the nest prior to fledging (Quakenbush et al. 1998, Rojek 2006). Fledging occurs from 32-37 days post hatch (Obritschkewitsch et al. 2001, Rojek 2006).

Information on breeding site fidelity of Steller's eiders is limited. However, some information is available from the breeding ecology study at Barrow. Since the mid 1990s, five birds that were originally captured as confirmed nesters near Barrow were recaptured in subsequent years nesting near Barrow. The time between capture events ranged from 1 to 12 years and the distance between nests ranged from 0.1 to 6.3 km.

Life History – Non-breeding

Localized post-breeding movements.–Departure from the breeding grounds near Barrow differs between sexes and between breeding and non-breeding years. However, prior to their migration in both breeding and non-breeding years, some Steller's eiders stage in Elson Lagoon, North Salt Lagoon, Imikpuk Lake, and the Chukchi Sea in the vicinity of Pigniq (Duck Camp). Male Steller's eiders typically leave the breeding grounds after females begin incubating, around the end of June or early July (Quakenbush et al. 1995, and Obritschkewitsch et al. 2001). Groups of Steller's eiders have been observed just off the Chukchi beach from the gravel pits, which are south of Barrow, north to Nuvuk (the northern most point of the Barrow spit). In breeding years these flocks were comprised of mostly drakes and persisted until about the second week of July (J. Bacon, North Slope Borough Department of Wildlife Management [NSBDWM], pers. comm.).

Females that successfully hatch nests and fledged young depart the breeding grounds in late August to mid-September and stage in water bodies near Pigniq prior to their southward migration along the Chukchi coast. From mid-July through September single hens, hens with broods, and small groups of two to three birds have been observed in North Saltwater Lagoon, Elson Lagoon and near shore on the Chukchi Sea. The majority of observations have been of individuals swimming in North Salt Lagoon, but occasionally individuals and small groups flying between North Salt Lagoon, Elson Lagoon and the Chukchi Sea have been observed. Hens with broods have been observed mostly near the channel that connects North Salt Lagoon and Elson Lagoon (J. Bacon, NSBDWM, pers. comm.). In 2008, 10-30 Steller's eider adult females and juveniles were observed daily between late August and mid-September staging in Elson Lagoon, North Salt Lagoon, Imikpuk Lake, and the Chukchi Sea (USFWS, unpublished data).

Females whose nests fail may also remain near Barrow later in summer; a single failed-nesting female equipped with a transmitter in 2000 remained near the breeding site until the end of July and stayed in the Beaufort Sea off Barrow until late August (Martin et al. *in prep*).

In non-breeding years, groups of Steller's eiders are observed just off the Chukchi beach from the gravel pits north to Nuvuk, however they became absent earlier compared to breeding years and the sex ratios were more even (J. Bacon, NSBDWM, pers. comm.). Telemetry data showed at least 5 of 14 birds used Elson Lagoon and males and females dispersed across the area between Wainwright and Admiralty Inlet in late June and early July, with most birds entering marine waters by the first week of July (Martin et al. *in prep*.).

Migration Patterns Related to Breeding Origin.
There is limited information available on the migratory movements of Steller's eiders, particularly connecting breeding populations with migratory routes or specific molting or wintering areas. The best information available is from two satellite telemetry studies of Steller's eiders. One study marked Steller's eiders wintering on Kodiak Island, Alaska and followed birds through the subsequent spring (n = 24) and fall (n = 16) migrations from 2004 – 2006 (D. Rosenberg, Alaska Department of Fish and Game [ADFG]). Most of the birds marked on Kodiak returned to eastern arctic Russia during the nesting period, and none of these birds (all presumed to be from the Russian breeding population) were relocated on land or the near shore waters North of the mouth of the Yukon River in Alaska (ADFG, unpublished data). The second (but earlier) study marked birds (n = 14) near Barrow, Alaska (within the range of the listed Alaska-breeding population) in 2000 and 2001(Martin et al. in prep). Birds from this study were relocated subsequently along arctic coast of Alaska Southwest of Barrow to areas near Pt. Hope, on the Seward Peninsula, and in Southern Norton Sound (Martin et al. in prep). The birds marked near Barrow were also relocated further South in Alaska and in eastern arctic Russia in similar locations to birds marked in Kodiak. Based on the data from two satellite telemetry studies of Steller's eiders in Alaska, it remains unclear where the the Russia and Alaska breeding populations merge and diverge during molt and spring migrations, respectively.

Molt and Winter Distribution.– During post-breeding migration, Steller's eiders move toward molting areas in the near shore waters of Southwest Alaska where they undergo a complete flightless molt for about 3 weeks. The combined (Russian and Alaskan-breeding) Pacific population molts in numerous locations in Southwest Alaska, with exceptional concentrations in four areas along the north side of the Alaska Peninsula: Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands (Gill et al. 1981, Petersen 1981, Metzner 1993). Additionally, smaller numbers are known or thought to molt in a number of other locations along the western Alaska coast, around islands in the Bering Sea, along the coast of Bristol Bay, and in smaller lagoons along the Alaska Peninsula (Swarth 1934; Dick and Dick 1971; Petersen and Sigman 1977; Wilk et al. 1986; Dau 1987; Petersen et al. 1991).

After molt, many of the Pacific-wintering Steller's eiders disperse to additional areas in the eastern Aleutian Islands, the south side of the Alaskan Peninsula, Kodiak Island, and as far east as Cook Inlet, although thousands may remain in lagoons used for molting unless or until freezing conditions force them to move (USFWS 2002). During the winter, this species congregates in select near shore waters throughout the Alaska Peninsula and the Aleutian Islands, around Nunivak Island, the Pribilof Islands, the Kodiak Archipelago, and lower Cook Inlet (Larned 2000b, Bent 1987, Agler et al. 1994, Larned and Zwiefelhofer 1995). Wintering Steller's eiders usually (although not always; Martin et al. in prep.) occur in waters less than 10 m deep, which are normally within 400 m of shore or at offshore shallows.

Northward Spring Migration.– During spring migration, thousands of Steller's eiders stage in estuaries along the north side of the Alaska Peninsula, including some molting lagoons, and at the Kuskokwim Shoals near the mouth of the Kuskokwim River in late May (Larned 2007, Martin et al. *in prep*.). Like other eiders, Steller's eider may use spring leads for feeding and resting, but there is little information on habitat use during spring migration. Spring migration usually includes movements along the coast, although birds may take shortcuts across water bodies such as Bristol Bay (W. Larned, USFWS, pers. comm. 2000). Interestingly, despite many daytime aerial surveys, Steller's eiders have never been observed during migratory flights (W. Larned, USFWS, pers. comm. 2000). Larned (1998) concluded that Steller's eiders show strong site fidelity to "favored" habitats during migration, where they congregate in large numbers to feed before continuing their northward migration.

Several areas receive consistent use by Steller's eiders during spring migration, including Bechevin Bay, Morzhovoi Bay, Izembek Lagoon, Nelson Lagoon/Port Moller Complex, Cape Seniavin, Seal Islands, Port Heiden, Cinder River State Critical Habitat Area, Ugashik Bay, Egegik Bay, Kulukak Bay, Togiak Bay, Nanwak Bay, Kuskokwim Bay, Goodnews Bay, and the south side of Nunivak Island (Larned et al. 1993, Larned 1998, Larned 2000a, Larned 2000b).

Steller's Eider Abundance and Trends – Pacific Population

The majority of the world population of Steller's eiders migrates along the Bristol Bay coast of the Alaska Peninsula in the spring, where they linger en route to feed at the mouths of lagoons and other productive habitats. Annual spring aerial surveys have been conducted since 1992 to monitor the population status and habitat use of Steller's eiders (*Polysticta stelleri)* staging for spring migration in southwestern Alaska. Annual Steller's eider estimates ranged from 137,904 (1992) to 54,888 (2010), mean 73,904. The long-term trend indicates an exponential decline of 2.7 percent per year (R^2=0.43; Larned and Bollinger, 2010). Larned and Bollinger (2010) suggest that a slight negative trend bias may have resulted from a higher frequency of optimally-timed counts in early years due to free selection from among survey replicates, compared to the single annual counts in subsequent years. A variable low-bias may also be present in most annual estimates due to inaccuracies in timing, observer effects and other uncontrolled variables (Larned and Bollinger 2010).

Steller's Eider Abundance and Trends – Listed Alaska-Breeding

The listed Alaska-breeding population is only a small proportion of the Pacific-wintering population of Steller's eiders, approximately 0.8%. This estimate is derived by taking the most recent North Slope breeding bird estimate of 576 birds (described below, Stehn and Platte, 2009), adding 1 for the YKD population, and then dividing by the population estimate of Pacific-wintering Steller's eiders from 2010 (73,904; Larned and Bollinger 2010). Thus, 577 ÷ 73,904 = 0.8% or rounded to 1%.

Stehn and Platte (2009) conducted a review of the distribution, abundance, and trends of the listed population of Steller's eiders on the arctic coastal plain (ACP). Using data from three aerial surveys, (the ACP, the North Slope eider survey [NSE], and the Barrow Triangle survey [ABR]), they assessed population status and trends of the Steller's eider population nesting on the ACP of Alaska. Data reported from these three surveys provide different estimates of average population size and trend. The 1989-2006 ACP survey (Mallek et al. 2007) estimated a total average population size of 866 birds with a declining population growth rate of 0.778 (Stehn and Platte 2009); the NSE survey (1992-2008; Larned et al. 2009) averaged 162 birds with increasing growth rate of 1.059. The ABR survey, which surveys only the Barrow triangle, which is a subset of the larger ACP and NSE survey areas (1999-2007; Obrishkewitsch et al. 2008) averaged 100 birds with a growth rate of 0.934. Average population size and trend can be biased by changes in observer, detection rates and survey timing. Survey timing was considered especially important for species with male departure early in incubation, or other marked shifts in habitat use, movements, or flocking behavior (ground breeding surveys near Barrow indicate the best time for aerial surveys of breeding Steller's eiders is about 12-20 June, after arrival of most breeding individuals but before most males depart. Using a subset of data least confounded by changes in survey timing and observer, the appropriately-timed NSE survey observations from 1993-2008 averaged 173 indicated total Steller's eiders (88-258, 90% confidence interval) with an estimated growth rate of 1.011 (0.857 – 1.193, 90% CI). The authors assumed a detection probability of 30% (based upon reasonable estimates with similar species and habitats), yielding a total average population of Steller's eiders breeding in the ACP of about 576 (292-859, 90% CI; Stehn and Platte 2009).

Standardized ground surveys for eiders near Barrow have been conducted since 1999, and have found an average density near Barrow of 0.63 birds/ km^2 (Rojek 2008). The Barrow vicinity supports the largest known concentration of nesting Steller's eiders in Alaska. The highest number of Steller's eiders observed during systematic surveys at Barrow occurred in 1999 with 135 males counted during ground surveys (36 nests found); in 2008, 114 male Steller's eiders were counted during ground surveys (28 nests found). Counts of males are the most reliable indicator of Steller's eider presences because females are cryptic and are often undercounted. Approximately 90% of all Steller's eiders nests found near Barrow since 1991 were within one mile of the Barrow road network (1991-2007 locations are summarized in Rojek 2008; 2008 locations are USFWS, unpublished data).

Recovery Criteria

The Steller's Eider Recovery Plan (USFWS 2002) presents research and management priorities, that are re-evaluated and adjusted every year, with the objective of recovery and delisting so that protection under the Act is no longer required. When the Alaska-breeding population was listed as threatened, factors causing the decline were unknown, but possible causes identified were increased predation, over hunting, ingestion of spent lead shot in wetlands, and habitat loss from development. Since listing, other potential threats have been identified, including exposure to other contaminants, scientific research, and climate change but causes of decline and obstacles to recovery remain poorly understood.

Criteria used to determine when species are recovered are often based on historical abundance and distribution, or on the number needed to ensure the risk of extinction is tolerably low (with extinction risk estimated by population modeling). For Steller's eiders, information on historical abundance is lacking, and demographic parameters needed for accurate population modeling are poorly understood. Therefore, the Recovery Plan for Steller's eiders establishes interim recovery criteria based on extinction risk, with the assumption that numeric population goals will be developed as demographic parameters become better understood. Under the Recovery Plan, the Alaska-breeding population would be considered for reclassification to endangered if the population has ≥ 20% probability of extinction in the next 100 years for 3 consecutive years, or the population has ≥ 20% probability of extinction in the next 100 years and is decreasing in abundance. The Alaska-breeding population would be considered for delisting from threatened status if it has ≤ 1% probability of extinction in the next 100 years, and each of the northern and western subpopulations are stable or increasing and have ≤ 10% probability of extinction in 100 years.

Steller's Eider Critical Habitat

In 2001, the Service designated 2,830 mi^2 (7,330 km^2) of critical habitat for the Alaska-breeding population of Steller's eiders at breeding areas on the Y- K Delta, a molting and staging area in the Kuskokwim Shoals, and molting areas in marine waters at Seal Islands, Nelson Lagoon, and Izembek Lagoon (66 FR 8849, February 2, 2001). No critical habitat for Steller's eiders has been designated on the ACP. In accordance with section 3(5)(A)(i) of the Act and regulations in 50 C.F.R. 424.12, critical habitat for a species contains those physical or biological features that are essential for the conservation of the species and which may require special management considerations and protection. Under the Act these features are considered "primary constituent elements" of critical habitat, and include, but are not limited to: space for individual and population growth, and for normal behavior; food, water air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and habitats that are protected from disturbance or are representative of the historical geographic and ecological distribution of a species.

3.2 Spectacled Eider

Physical Appearance

Spectacled eiders are large sea ducks. Males in breeding plumage have a white back, black breast, and pale green head with large white “spectacles” around the eyes. In late summer and autumn males molt into a mottled brown plumage that lasts until late fall, when they re-acquire breeding plumage. Females are mottled brown year round, with pale tan spectacles. Juveniles attain breeding plumage in their second (female) or third (male) year; until then they are mottled brown (Petersen et al. 2000). Both males and females have long sloped bills, giving them a characteristic profile (Figure 3.3).

Figure 3.3 - Male and female spectacled eiders in breeding plumage.

Distribution and Status

Spectacled eiders inhabit the North Pacific. There are three primary breeding populations; those on Alaska’s North Slope, the Y-K Delta, and northern Russia. Historically, spectacled eiders nested in Alaska discontinuously from the Nushagak Peninsula north to Barrow, and east nearly to Canada’s Yukon Territory (Phillips 1922-1926, Bent 1925, Bailey 1948, Dau and Kistchinski 1977, Derksen et al. 1981, Garner and Reynolds 1986, Johnson and Herter 1989). The entire species was listed throughout its range as threatened on May 10, 1993 (USFWS 1993) because of documented population declines. The Y-K Delta population had declined 96% between the 1970s and early 1990s (Stehn et al. 1993, Ely et al. 1994), and anecdotal information indicated that populations in the other two primary breeding areas had also declined (USFWS 1996). The global population of spectacled eiders is estimated at 363,000 birds (Petersen et al. 1999), or 418,420 birds (USFWS & USGS Spectacled Eider Experts Meeting 2006).

Spectacled eiders molt in several discrete areas (Figure 3.4), with birds from the different populations and genders apparently favoring different molting areas (Petersen et al. 1999). After molting, spectacled eiders migrate to openings in pack ice of the central Bering Sea south/southwest of St. Lawrence Island (Petersen et al. 1999; Figure 3.4), where they remain until March or April (Lovvorn et al. 2003).

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 3.5). 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).

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 3.4 - Distribution of spectacled eiders.

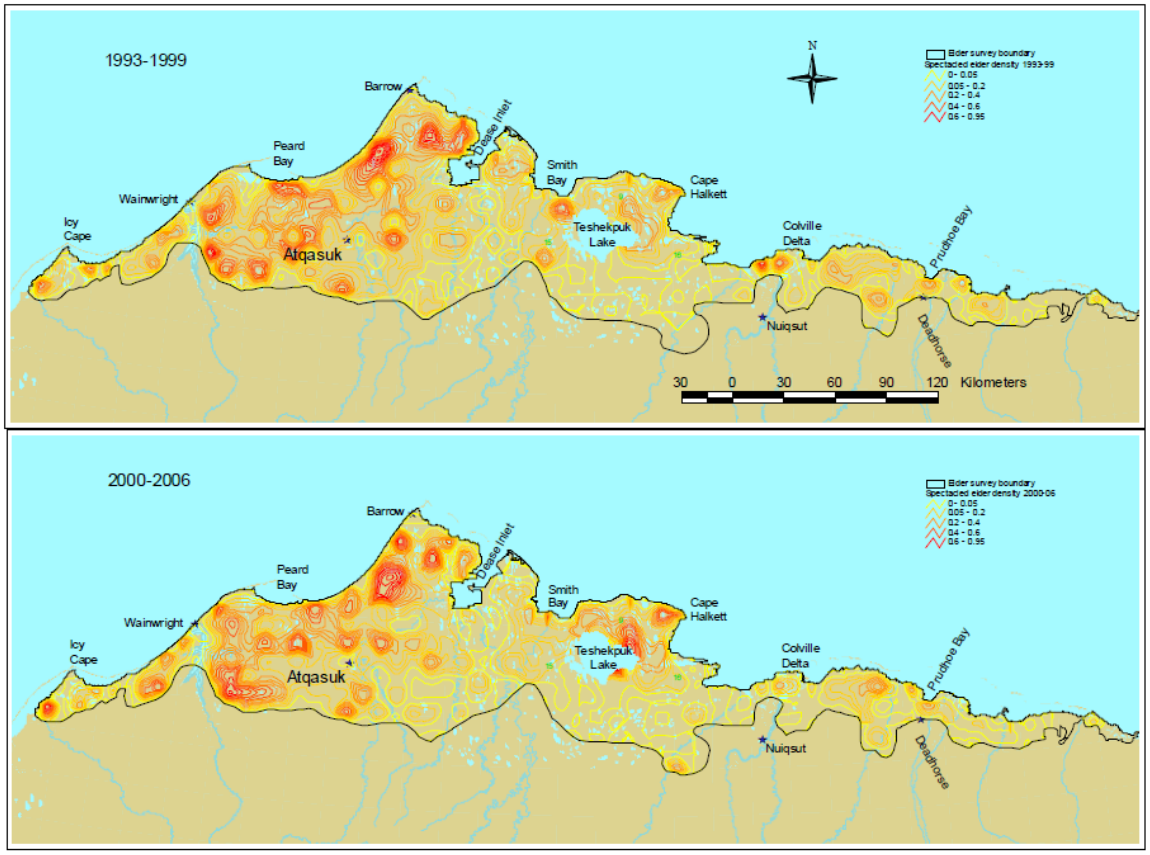

Figure 3.5 – Mean spectacled eider breeding density across Alaska's Arctic Coastal Plain 1993-1999 (above) and 2000 – 2006 (below); from Larned et al. (2006).

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* 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; 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)

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), 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 within the primary nesting area, the central coast zone of the Y-K Delta (Platte and Stehn 2009).

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 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 directly from freshwater to marine habitats. Nest success is variable and greatly influenced by predators, including gulls (*Larus* spp.), jaegers (*Stercorarius* spp.), 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.

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).

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)

General

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 – North Slope

Males generally depart breeding areas when the females begin incubation in late June (Anderson and Cooper 1994, Bart and Earnst 2005). Use of the Beaufort Sea by departing males is variable. Some appear to move directly to the Chukchi Sea over land, while the majority moved rapidly (average travel of 1.75 days), over 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.

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).

Post-breeding – Y-K Delta

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).

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 3.4). 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 (*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 (*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. Information obtained in 2002-2006 about 57 satellite marked king eiders found that 100% of the birds migrating from the Bering Sea to breeding grounds in North America occupied the spring lead system in the eastern Chukchi for approximately 3-4 weeks (S. Oppel, University of Alaska Fairbanks, unpublished data).

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]) .

4. 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.

4.1 Spectacled and Steller's Eiders

Status in the Action Area
The North Slope and Y-K Delta breeding populations of spectacled eiders (approximately 12,506 and 11,411 breeding birds, respectively), and Steller's eiders (approximately 576 breeding birds) occupy terrestrial and marine portions of the Action Area for significant portions of their life history. Spectacled and Steller's eiders from both the Y-K Delta and North Slope breeding populations spend the majority of their annual cycle within the terrestrial and marine environments of the Action Area. During the proposed action (hunt dates 2 April – 31 August), Steller's and spectacled eiders can be moving from wintering to breeding areas, on breeding area, migrating from breeding to molting areas, and on molting areas. Spectacled eiders occur in the following AMBCC regions during the proposed action: North Slope, Northwest Arctic, Bering Strait/Norton Sound, and YK Delta. Steller's eiders have a wider distribution during the proposed action and can occur in the same AMBCC regions as spectacled eiders in addition to the following regions: Aleutian/Pribilof Islands, Bristol Bay, Kodiak, and Cook Inlet.

Both species have undergone significant, unexplained declines in their Alaska-breeding populations. Factors that may have contributed to the current status of spectacled and Steller's eiders are discussed below and include, but are not limited to, toxic contamination of habitat, increased predator populations, harvest, and impacts of development, science impacts, and climate change. Factors that affect adult survival may be the most influential on population growth rates. Recovery efforts for both species are underway in portions of the Action Area.

Data from annual aerial surveys adjusted by a surrogate visual correction factor estimates the North Slope-breeding population of spectacled eiders is approximately 12,506 individuals most of which nest in the Action Area. Of spectacled eiders observed on the North Slope during aerial surveys, the highest densities of spectacled eiders are consistently found in the Barrow Triangle, the area near Peard Bay, southeast of Wainwright, and northeast of Teshekpuk Lake (Figure 3.5).

As discussed in *Section 3 – Status of the Species*, it is difficult to determine the number of Steller's eiders that breed on the North Slope. However, annual aerial eider surveys show Steller's eiders are not evenly distributed across the ACP, with highest densities occurring in the Barrow Triangle, which comprises lands near Barrow, north of 70°50' N and west of Dease Inlet. This area accounts for only 4.8% of the survey area, but contained 40% of all Steller's eider observations in the aerial surveys. This is likely an underestimate of the proportion of Steller's eiders in this area because: 1) the scale of the concentration is too small to be adequately represented in the sampling regime; and 2) a portion of the concentration area is excluded because the area near the Barrow airport cannot be surveyed due to aviation safety concerns. Both species have undergone significant, unexplained declines in their Alaska-breeding populations. Factors that may have contributed to the current status of spectacled and Steller's eiders are discussed below and include, but are not limited to, toxic contamination of habitat, increased predator populations, harvest, and impacts of development, science impacts, and climate change. Factors that affect adult survival may be most influential on population growth rates. Recovery efforts for both species are underway in portions of the Action Area.

Increased Predator Populations
There is some evidence that predator and scavenger populations may be increasing on the North Slope near sites of human habitation, such as 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., Day 1998). These anthropogenic influences on predator populations and predation rates may have affected eider populations, but this has not been substantiated. However, increasing predator populations are a concern, and Steller's eider studies at Barrow attributed poor breeding success to high predation rates (Obritschkewitsch et al. 2001), and in years where arctic fox removal was conducted at Barrow prior to and during Steller's eider nesting, nest success appears to have increased significantly (Rojek 2008).

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 the U.S. Bureau of Land Management (BLM) (2007) predicts 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. Major community development projects such as the new hospital, landfill, and water treatment plant at Barrow, airport improvements and development of science support facilities in the area, have all undergone formal section 7 consultations
There are currently few permanent structures associated with the oil and gas industry in National Petroleum Reserve-Alaska (NPR-A), a vast area that contains virtually all currently occupied nesting habitat for the listed population of Steller's eiders, and almost 90% of the North Slope breeding habitat of spectacled eiders (USFWS 2008). However, development has steadily moved westward towards NPR-A since the initial discovery and development of oil on the North Slope. Given industry's interest in NPR-A as expressed by lease sales, seismic surveys, drilling of exploratory wells, and the construction of the Alpine field, industrial development is likely to continue in NE and NW NPR-A. Development in NPR-A may also facilitate development in more remote, currently undeveloped areas such as the Chukchi Sea or areas of the Beaufort Sea, and vice versa. Formal section 7 consultations were conducted for MMS's Lease Sale 193 in the Chukchi Sea, and Lease Sales 185, 196, and 202 in the Beaufort Sea. Consultation on these areas will continue if development proceeds past the exploration phase under the incremental step consultation authority granted to Outer Continental Shelf (OCS) activities (50 CFR § 402.14(k)).

Incidental Take

Recent activities across the North Slope 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 biological opinion. 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 Y-K Delta 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 Y-K Delta

(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 Y-K Delta, 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 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 in Alaska that required formal section 7 consultation and the amount of incidental take provided.

Project Name	Impact Type	Estimated Incidental Take
False Pass Harbor (2001)	Contaminants	4 adult Steller's eiders
NPDES-GP (2001)	Collisions	1 adult Steller's eider
Chignik Lagoon Tank Farm (2001)	Contaminants	14 adult Steller's eiders
Chignik Dock (2002)	Contaminants	4 adult Steller's eiders
Chignik Bay Tank Farm (2002)	Contaminants	5 adult Steller's eiders
Sandpoint Harbor (2002)	Contaminants Collisions Habitat loss	13 adult Steller's eiders
Beaufort Sea Planning Area Lease Sale 186, 195, & 202 (2002)	Collisions	5 adult spectacled eiders 1 adult Steller's eider
Fairweather Seismic (2003)	Disturbance	66 adult Steller's eiders
Nelson Lagoon Tank Farm (2003)	Contaminants Collisions	21 adult Steller's eiders
Akutan Mooring Basin (2003)	Contaminants Collisions	10 adult Steller's eiders
Alpine Development Project (2004)	Habitat loss Collisions	4 spectacled eider eggs/ducklings 3 adult spectacled eiders
Barrow Airport Expansion (2006)	Habitat loss	14 spectacled eider eggs/ducklings 29 Steller's eider eggs/ducklings
Barrow Hospital (2004 & 2007)	Habitat loss	2 spectacled eider eggs/ducklings 17 Steller's eider eggs/ducklings
Barrow Landfill (2003)	Habitat loss	1 spectacled eider nest/ year 1 Steller's eider nest/year

Barrow Artificial Egg Incubation	Removal of eggs for captive breeding program	Maximum of 24 Steller's eider eggs
Barrow Tundra Manipulation Experiment (2005)	Habitat loss Collisions	2 spectacled eider eggs/ducklings 1 Steller's eider eggs/ducklings 2 adult spectacled eiders 2 adult Steller's eiders
Barrow Global Climate Change Research Facility, Phase I & II (2005 & 2007)	Habitat loss Collisions	6 spectacled eider eggs/ducklings 25 Steller's eider eggs/ducklings 1 adult spectacled eider 1 adult Steller's eider
Barrow Wastewater Treatment Facility (2005)	Habitat loss	3 Steller's eider eggs/ducklings 3 spectacled eider eggs/ducklings
Savoonga Wind Turbine (2005)	Collisions	1 adult spectacled eider
Chukchi Sea Lease Sale 193 (2007)	Collisions	3 adult spectacled eiders 1 adult Steller's eider
ABR Avian Research/USFWS Intra-Service Consultation	Disturbance	5 spectacled eider eggs/ducklings
Pioneer's Ooguruk Project	Habitat loss Collisions	3 spectacled eider eggs/ducklings 3 adult spectacled eiders
BP's 69Kv Powerline	Collisions	10 adult spectacled eiders over 50 years
BP's Liberty Project	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	
BP Alaska's Northstar Project	Collisions	≤ 2 adult spectacled eiders/year ≤ 1 adult Steller's eider/year
KMG Nikaitchuq Project	Habitat loss Collisions	2 spectacled eiders/year 7 adult spectacled eiders over 30 years
Akutan Transportation (2007)	Disturbance	20 adult Steller's eiders
Unalaska Harbor (2007)	Contaminants Collisions Habitat loss	3 adult Steller's eiders
Intra-Service Consultation 2007 on MBM Avian Influenza Sampling	Disturbance	6 spectacled eider eggs/ducklings
BLM 2007 Programmatic on Summer Activities in NPR-A	Disturbance	21 spectacled eider eggs/ducklings
Goodnews Bay Processor (2008)	Disturbance	28 adult Steller's eiders
Intra-service on Subsistence Hunting Regulations 2008	No estimate of incidental take provided	
BLM 2008 Programmatic on Summer Activities in NPR-A	Disturbance	56 spectacled eider eggs/ducklings
BLM 2009 Programmatic on Summer Activities in NPR-A	Disturbance	49 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 Consultation 2008	Disturbance	21 spectacled eider eggs/ducklings

NOAA National Weather Service Office in Barrow	Habitat loss Disturbance Collision	< 4 spectacled eider eggs/ducklings < 10 Steller's eider eggs/ducklings 1 adult Steller's eider
Intra-service on Subsistence Hunting Regulations 2009	No estimate of incidental take provided	
Intra-Service on Section 10 permit for Dr. Peterson's 2009 PTT project	Loss of Production Capture/surgery	130 spectacled eider eggs/ducklings 4 adult spectacled eiders
MMS Beaufort and Chukchi Sea Program Area Lease Sales (2009)	Collision	12 adult spectacled eiders <1 adult Steller's eider
Intra-Service, Migratory Bird 2010 Subsistence Hunting Regulations	No estimate of incidental take provided	
Intra-Service, Section 10 permit for Dr. Peterson's telemetry research on spectacled eider use of the the Chukchi and Beaufort Seas (2010)	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 for activities between June 5 and Oct 31, 2010	Disturbance	32 Spectacled eider eggs
Intra-Service, Migratory Bird Management goose banding on the North Slope of Alaska (2010)	Disturbance	4 spectacled eider eggs/ducklings
Intra-Service, Section 10 permit for USFWS eider survey work at Barrow (2010)	Disturbance Capture/handling	3 Steller's eider or spectacled eider clutches 90 pairs + 60 hens, Steller's eider 60 pairs + 60 hens, spectacled eider 1 Steller's eider or spectacled eider adult (lethal take) 7 ducklings Steller's eider or spectacled eider (lethal take) 30 Steller's eider or spectacled eider hens (nonlethal take) 40 Steller's eider or spectacled eider ducklings (nonlethal take)
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

Research

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.

The FWS has issued permits under Section 10 of the ESA to authorize take of endangered or threatened species for purposes of propagation, enhancement, or survival.

Annual reporting requirements associated with §10 permits for both spectacled and Steller's eiders indicate 11 spectacled eider adults and 5 eggs have reportedly died as an indirect result of research activities since 1993 (due to the numerous amended actions and permits, and because of the variation and inconsistencies in reporting, accomplishing a precise tally of incidental take proved difficult).
From 1997 to present, the Service estimates approximately 1 Steller's eiders from the listed Alaska-breeding population has died incidental to research activities (based on a total of 37 Steller's eiders reportedly taken from the non-listed Pacific-wintering population, incidental to research activities, and the estimate that approximately 1% of the Pacific-wintering population are Alaska-breeding Steller's eiders). Since listing, there likely have been no listed Steller's eider adults intentionally taken (from a probabilistic standpoint), though there have been 16 permitted and 16 actual, direct and intentional takings of non-listed Steller's eider adults. Additionally, permits have been issued to salvage and opportunistically collect up to 68 Steller's eider eggs from the Alaska-breeding population for a captive breeding program at the Alaska Sea Life Center (ASLC). To date, 31 eggs have been taken. The eiders taken in these research programs have provided biological information and the eggs have been used to establish a captive breeding population of the species to ultimately improve our understanding of their reproduction in the wild and help future efforts to recover the species.

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 arctic water bodies are draining and drying out during summer as the underlying permafrost thaws (Smith et al. 2005, Oechel et al. 1995). Further, many are losing water through increased evaporation and evapotranspiration resulting from longer ice-free periods, warmer temperatures, and longer growing seasons (Schindler and Smol 2006, 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 also resulting in changes in the algal and invertebrate communities that 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 decreases in extent and duration. 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 ranges 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 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 the Action Area are unclear, species with small populations are more vulnerable to environmental change (Crick 2004). Some species may increase in abundance or range with climate change, while others will suffer from reduced population size or range. The ultimate effects of climate change which will impact both the terrestrial and marine habitats of listed eiders are undetermined at present. While it is certain that listed eiders will be impacted by the effects of climate change on their terrestrial and marine habitats, it is presently impossible to predict the direction or magnitude of these individual impacts or their combined sum.

Summary of Environmental Baseline

Because this is a state-wide consultation with a very large Action Area (the ACP alone is about the size of Minnesota), the environmental baseline is necessarily also quite large and complex. The listed eiders are migrating to and breeding principally on the Y-K Delta and ACP during the Action, so that will focus the evaluation. As discussed above, because the Service has consulted upon these regulations since their inception in 2003, it now has several years of harvest survey information documentation of the effects of the action on listed species. The Service has also included information in the environmental baseline about the MOU between the subsistence community representatives and the Service describing the collaboration that will occur during the harvest to reduce/eliminate shooting mortality and injury of Steller's eiders. Thus, the environmental baseline, which describes the present human and natural context, provides the starting point for the Service's effects analysis.

5. EFFECTS OF THE ACTION ON LISTED SPECIES

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

5.1 Direct Effects

The proposed project may adversely affect listed eiders through disturbance. Aircraft landings and on-the-ground activities may flush females from their nests. This exposes eggs or young ducklings to inclement weather and predators. Hens may damage eggs as they are flushed from a nest (Major 1989); and may abandon nests entirely, particularly if disturbance occurs early in the incubation period (Livezy 1980, Götmark and Ählund 1984).

Individual tolerance and behavioral response of Steller's and spectacled eiders to disturbance likely varies. Steller's eiders have been observed nesting and raising broods close to the Barrow airport, and spectacled eiders are known to nest close to the Deadhorse airport (USFWS data). Studies of spectacled eider responses to aircraft and construction activities at the Alpine oilfield suggests broods can be raised successfully close to areas with significant levels of disturbance (Johnson et al. 2006). Disturbance that is regular and ongoing allows sensitive individuals to move away and less sensitive individuals to become habituated. Activities assessed in this BO will occur in remote areas of NPR-A where birds are not subject to regular disturbance and likely have not become habituated.

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. Data from the Y-K Delta 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). However, Mickleson (1975) suggested very low rates of desertion, 0.8% naturally with an additional 0.7% as a result of human disturbance, in his studies of cackling geese and spectacled eiders on the Y-K Delta. A 6% desertion rate for ducks nesting on a refuge in Wisconsin was documented by Livezey (1980), and Johnson (1984) documented several nests abandoned by female common eiders after human disturbance on Thetis Island, northern Alaska.

Predation is an important mechanism through which human disturbance affects 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 Y-K Delta. 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 likely that avian predators would also be more significant than mammalian predators if nests are disturbed on the North Slope.

The effects of human disturbance may be reduced if predators are also disturbed and move away from the area. While corvids appeared to negatively respond to humans and move away when disturbed, Götmark and Ählund (1984) noted a weak attraction to humans by gulls. In contrast Strang (1980) observed an attraction to humans from parasitic jaegers but not gulls. It remains unclear how human presence will affect predator behavior in NPR-A.

Summary

The landing and subsequent driving of birds by 3 float planes or people working in the onshore area may disturb nesting eiders to the extent that hens are flushed from their nests. Flushing events may result in damage to eggs by the departing hens, increased vulnerability of unattended eggs or ducklings to predation, and risk of eggs or ducklings dying from exposure if nests remain unattended for extended periods or are abandoned.

5.2 Indirect Effects

Indirect effects of the action are defined as “those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur” (50 CFR §402.02). While the studies proposed for 2011 may lead to additional research in the future, future studies cannot be said to be reasonably expected to occur. Therefore, no indirect effects to listed eiders are anticipated to result from the proposed activities.

5.3 Interrelated and Interdependent Actions

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

6. CUMULATIVE EFFECTS

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

Pre-development activities such as right-of-way staking, ice-road water source evaluations, and archeological surveys are increasing as oil and gas exploration continues in NPR-A. Concurrent increases in compliance inspections, habitat surveys, and resource monitoring activities are anticipated. Research on vegetation, soils, hydrology, and fauna in NPR-A is likely to increase as global climate change concerns focuses interest in high latitude areas. There are a number of study plots in the area providing baseline data, further increasing interest in use of the area by scientists. Because these actions will either be conducted by federal agencies, or require authorization by BLM, they are not considered cumulative impacts for the purposes of this BO.

Future oil development and its associated infrastructure (such as pipelines, processing facilities, and airstrips) was previously described and evaluated in the BOs for the Northeast and Northwest NPR-A IAP/EISs. If development exceeds that predicted in these plans, additional consultation would be required.

Other State, local government, or private activities that may take place in the action area include infrastructure development (such as roads, power lines, or telecommunication towers), increased tourism, and community growth. Because the majority of the action area is classified as wetlands, a section 404 permit from the U.S. Army Corps of Engineers would be necessary for proposed development and consultation under the Act would be required.

In summary, we anticipate potential increase in development, associated surveying and monitoring activities, scientific research, and community growth in coming decades. However, all significant projects have either been considered in previous consultations, or will require future consultation under the Act. Hence, no cumulative effects have been identified.

7. CONCLUSIONS

After reviewing the current status of spectacled and Alaska-breeding Steller’s eiders, the environmental baseline, effects of the proposed activities, and cumulative effects, it is the Service’s biological opinion that the proposed activities are not likely to jeopardize the continued existence of either species.

In evaluating the impacts of the proposed project to Steller’s and spectacled eiders, the Service concludes that direct adverse impacts could result through disturbance of nesting females from proposed activities.

Using methods and logic explained in the Incidental Take Statement below, we estimate up to 8 spectacled eider eggs or ducklings may be incidentally taken as a result of actions described in this BO. No incidental take of Steller’s eiders is anticipated.

While still take, it is important to note that the loss of eggs 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, at most 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.

The population of North Slope-breeding spectacled eiders is estimated at 12,916 (10,942–14,890 95% CI; Stehn et al. 2006); hence, the estimated loss of 8 eggs is not expected to have significant population-level effects. The Service believes this level of incidental take will not significantly affect the likelihood of survival and recovery of spectacled eiders.

8. INCIDENTAL TAKE STATEMENT

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

The measures described below are non-discretionary, and must be undertaken by the Migratory Bird Management Office (MBM Office) of the Service 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. The MBM Office has a continuing duty to regulate activities covered by this incidental take statement. If the MBM Office fails to assume and implement the terms and conditions, through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse.

As described in *Section 5 - Effects of the Actio*n, the activities described and assessed in this BO may adversely affect Steller’s and spectacled eiders through disturbance of nesting eiders by the landing and subsequent driving of birds by 3 float planes or people working in the onshore areas.

During this study float planes will land on lakes, and slowly herd geese towards an onshore banding station. It is estimated that each of the five banding drives may disturb listed eiders over an area of 2.59 km^2, although much of this area will be lake surface, and not eider nesting habitat. We have no data to determine how listed eiders may respond to this type of disturbance. Therefore, we have been as conservative as possible, and assumed all nests in the disturbed area will fail.

Spectacled eiders

Spectacled eider density polygons constructed from the 2007–2010 waterfowl breeding population survey of the Arctic Coastal Plain, Alaska (ACP survey; USFWS Migratory Bird Management, unpublished data) provide our best estimates of spectacled eider nesting in the project area. Density polygons were used to estimate incidental take, as described below.

Because actual banding locations could be adjusted based on local movements of molting geese, the number of spectacled eider hens that may be flushed during greater white-fronted goose banding activities at each site was calculated based on the highest estimated spectacled eider density estimate within 2 km of the proposed location (see Figure 1.1) and the area disturbed at each site (2.59 km^2). Loss of production of 8 eggs or ducklings from the resulting estimate of 2 spectacled eider flush events was calculated as follows:

Lake 1, 0.425 birds/km^2 × 0.5 nests/bird × 2.59 km^2 = 0.55 spectacled eider flush events;

Lake 2, 0.425 birds/km^2 × 0.5 nests/bird × 2.59 km^2 = 0.55 spectacled eider flush events;

Lake 3, 0.111 birds/km^2 × 0.5 nests/bird × 2.59 km^2 = 0.14 spectacled eider flush events;

Lake 4, 0.111 birds/km^2 × 0.5 nests/bird × 2.59 km^2 = 0.14 spectacled eider flush events;

Lake 5, 0.236 birds/km^2 × 0.5 nests/bird × 2.59 km^2 = 0.31 spectacled eider flush events;

total spectacled eider flush events = 1.69.

Average clutch size for spectacled eiders in northern Alaska is 3.9 (Petersen et. al. 2000, Bart and Earnst 2005, Johnson et al. 2008). Using this figure, we estimate that activities described in this BO would result in the loss of production of 2 spectacled eider nests (1.69 flush events), resulting in the loss of 8 spectacled eider eggs or ducklings (2 × 3.9 = 7.8).

Steller's eiders

Steller's eiders nesting on the ACP are concentrated near Barrow, AK north of the project area. Steller's eiders occur at very low densities on the ACP outside of the Barrow Triangle area. Larned et al. (2010) estimated 0.002 Steller's eiders/km^2 across the ACP survey area. We estimated potential Steller's eider flush events as follows:

0.002 birds/km^2 × 0.5 nests/bird × 12.95 km^2 = 0.01 Steller's eider flush events.

We anticipate that given the very low density of Steller's eiders in the action area it is unlikely that project activities would result in the loss of a Steller's eider nest (0.01 flush events) and no loss of production is likely to result from the proposed activities.

Conclusion
Using the data, assumptions, and methodology explained above, we estimate the proposed activities may result in the loss of 2 spectacled eider nests and significantly less than 1 Steller's eider nest. We estimate a resulting loss of production of 8 spectacled eider eggs or ducklings and no Steller's eider eggs or ducklings

9. REASONABLE AND PRUDENT MEASURES

These reasonable and prudent measures (RPMs) and their implementing terms and conditions aim to minimize the incidental take anticipated from activities described in this BO. As described in *Section 8 – Incidental Take Statement*, activities conducted by MBM Office are anticipated to lead to incidental take of spectacled eiders through disturbance of nesting females.

RPM A – To reduce the probability of depredation, any observed unattended eider nests should be covered with down, and field crews should leave the nest area as a soon as practicable.

RPM B – To increase our understanding of the impact of disturbance on nesting Steller's and spectacled eiders the location of any listed eider nests and observed responses of these birds should be reported.

10. TERMS AND CONDITIONS

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

RPM A – To reduce the probability of depredation, any observed unattended eider nests should be covered with down, and field crews should leave the nest area as a soon as practicable.

Covering unattended eggs with down after a hen flushes from a nest significantly reduces the rate of depredation (Vacca and Handel 1988, Götmark and Ählund 1984). Therefore, if unattended Steller's or spectacled eider nests are encountered field crews should cover eggs while following all pertinent health and safety guidelines. Crews should also leave the nest area as quickly as possible to allow the hen to return.

RPM B – To increase our understanding of the impact of disturbance on nesting Steller's and spectacled eiders the location of any listed eider nests and observed responses of these birds should be reported.

Any observations of Steller's or spectacled eiders, or their nests, along with the location, date of observation, and a brief description of any observed behavior (e.g., a hen flushed when the helicopter landed but was observed returning to her nest after 5 minutes), should be provided to the Endangered Species Branch of the Fairbanks Fish and Wildlife Field Office by September 1, 2011.

11. CONSERVATION RECCOMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We have identified no conservation recommendations for this project.

12. REINITIATION NOTICE

This concludes formal consultation for Region 7 Migratory Bird Management's proposed project Greater White-fronted Goose Banding, North Slope of Alaska, 2011. 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 cooperation in the development of this biological opinion. An 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 biological opinion, please have your staff contact Denise Walther, Fish and Wildlife Biologist, Fairbanks Fish and Wildlife Field Office at (907) 456-0277.

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APPENDIX 1

POLAR BEAR INTERACTION GUIDELINES

These Polar Bear Interaction Guidelines (Guidelines) were developed to ensure that activities are conducted in a manner that avoids conflicts between humans and polar bears. Polar bears are protected under the Marine Mammal Protection Act (MMPA), and were listed as a threatened species under the Endangered Species Act (ESA) in 2008. The MMPA and ESA both prohibit the "take" of polar bears without authorization. Take includes disturbance/harassment, as well as physical injury and killing of individuals.

In addition to sea ice, polar bears use marine waters and lands in northern Alaska for resting, feeding, denning, and seasonal movements. They are most likely to be encountered within 25 miles of the coastline, especially along barrier islands during July-October. Polar bears may also be encountered farther inland, especially females during the denning period (October-April). Polar bears may react differently to noise and human presence. The general methods for minimizing human-bear conflicts are to: 1) avoid detection and close encounters; 2) minimize attractants; and 3) recognize and respond appropriately to polar bear behaviors. These Guidelines provide information for avoiding conflicts with polar bears during air, land, or water-based activities.

Unusual sightings or questions/concerns can be referred to: Susanne Miller or Craig Perham, Marine Mammals Management Office (MMM Office), 1-800-362-5148; or to Sarah Conn (907) 456-0499 of the Fairbanks Fish & Wildlife Field Office (FFWFO).

<u>When operating aircraft:</u>

- If a polar bear(s) is encountered, divert flight path to a minimum of 2,000 feet above ground level or ½ mile horizontal distance away from observed bear(s) whenever possible.

<u>When traveling on land or water:</u>

- Avoid surprising a bear. Be vigilant—especially on barrier islands, in river drainages, along bluff habitat, near whale or other marine mammal carcasses, or in the vicinity of fresh tracks.

- Between October and April special care is needed to avoid disturbance of denning bears. If activities are to take place in that time period the MMM Office should be contacted to determine if any additional mitigation is required. In general, activities are not permitted within one mile of known den sites.

- Avoid carrying bear attractants (such as strongly scented snacks, fish, meat, or dog food) while away from camp; if you must carry attractants away from camp, store foods in air-tight containers or bags to minimize odor transmission until you return them to "bear-resistant" containers.*

- If a polar bear(s) is encountered, remain calm and avoid making sudden movements. Stay downwind if possible to avoid allowing the bear to smell you. Do not approach polar bears. Allow bears to continue what they were doing before you encountered them. Slowly leave the vicinity if you see signs that you've been detected. Be aware that safe viewing distances will vary with each bear and individual situation. Remember that the closer you are to the animal, the more likely you are to disturb it.

- If a bear detects you, observe its behavior and react appropriately. Polar bears that stop what they are doing to turn their head or sniff the air in your direction have likely become aware of your presence. These animals may exhibit various behaviors:

  - *Curious* polar bears typically move slowly, stopping frequently to sniff the air, moving their heads around to catch a scent, or holding their heads high with ears forward. They may also stand up.

  - *A threatened or agitated* polar bear may huff, snap its jaws together, stare at you (or the object of threat) and lower its head to below shoulder level, pressing its ears back and swaying from side to side. These are signals for you to begin immediate withdrawal by backing away from the bear. If this behavior is ignored, the polar bear may charge. Threatened animals may also retreat.

  - In rare instances you may encounter a *predatory* bear. It may sneak or crawl up on an object it considers prey. It may also approach in a straight line at constant speed without exhibiting curious or threatened behavior. This behavior suggests the bear is about to attack. Standing your ground, grouping together, shouting, and waving your hands may halt the bear's approach.

- If a polar bear approaches and you are in the bear's path—or between a mother and her cubs—get out of the way (without running). If the animal continues to approach, stand your ground. Gather people together in a group and/or hold a jacket over your head to look bigger. Shout or make noise to discourage the approach.

- If a single polar bear attacks, defend yourself by using any deterrents available. If the attack is by a surprised female defending her cubs, remove yourself as a threat to the cubs.

<u>When camping:</u>

- Avoid camping or lingering in bear high-use areas such as river drainages, coastal bluffs and barrier islands.

- Store food and other attractants in "bear-resistant" containers*. Consider the use of an electric fence as additional protection. Do not allow the bear to receive food as a reward in your camp. A food-rewarded bear is likely to become a problem bear for you or someone else in the future.

- Maintain a clean camp. Plan carefully to: minimize excess food; fly unnecessary attractants out on a regular basis (i.e. garbage, animal carcasses, excess anti-freeze or petroleum products); locate latrines at least ¼ mile from camp; and wash kitchen equipment after every use.

- If a polar bear approaches you in camp, defend your space by gathering people into a large group, making noise and waving jackets or tarps. Continue to discourage the bear until it moves off. Have people watch the surrounding area in case it returns later, keeping in mind that polar bears are known to be more active at night. Additional measures to protect your camp, such as electric fences or motion sensors can be used.

Harassment of polar bears is not permissible, unless such taking (as defined under the MMPA) is imminently necessary in defense of life, and such taking is reported to FWS within 48 hours.

*Containers must be approved and certified by the Interagency Grizzly Bear Committee as "bear-resistant." Information about certified containers can be found at http://www.igbconline.org/html/container.html.

FOR DEPARTMENT OF INTERIOR EMPLOYEES ONLY

Use of Deterrents

In addition to following the Guidelines above, all U.S. Fish and Wildlife Service (Service) employees must have completed the Department of the Interior's (DOI) Bear and Firearm Safety Training course and be current in certification before engaging in field activities. Service staff must practice with and know how to use deterrents prior to conducting field work. If working in bear habitat, Service staff must anticipate and plan for possible scenarios of encountering polar bears, and identify appropriate responses, prior to initiating field work. Use of non-lethal polar bear deterrents by Service staff is only permissible if it is done in a humane manner and is for the purposes of protection or welfare of the bear or the public. Service staff has the right to use lethal methods to protect the public from polar bears in defense of life situations, and may do so when all reasonable steps to avoid killing the bear(s) have been taken.

Notification of Use of Deterrents

The Department of the Interior Bear Incident Report Form will be used to record and report polar bear-human interactions *that require use of deterrents*. These incidents will be reported to the MMM Office. This information will be used to track interactions over time and improve polar bear conservation and management.