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
June 2, 2014

Matthew T. Moran
Natural Resource Program Manager
611 CES/CEAN
10471 20th St Suite 326
JBER, AK 99506-2200

Re: Biological Opinion for USAF remedial activity 2014-2014

Dear Mr. Moran,

This document transmits the U.S. Fish and Wildlife Service's (Service) final Biological Opinion (BO) on a proposal by the United States Air Force (USAF), to conduct remediation and restoration activities at 31 remote Alaskan short and long range radar stations.

This BO describes effects of the proposed activities on spectacled eiders (*Somateria fischeri*), Alaska-breeding Steller's eiders (*Polysticta stelleri*), polar bears (*Ursus maritimus*), northern sea otters (*Enhydra lutris kenyoni*), and the candidate species Yellow-billed loon (*Gavia adamsii*), and Pacific walrus (*Odobenus rosmarus*) pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.).

The Service has determined the proposed action may affect, but is not likely to adversely affect, Steller's eiders or polar bears, and is not likely to jeopardize the continued existence of the yellow-billed loon or Pacific walrus. The Service also determined the proposed action *may adversely affect* threatened spectacled eiders. Following review of the status and environmental baseline of listed eiders, and analysis of potential effects of the proposed action to this species, the Service has concluded the proposed action *is not likely to jeopardize* the continued existence of spectacled eiders.

Although northern sea otters may occur in nearshore marine waters adjacent to some USAF work sites (i.e., Eareckson AS, Nikolski RRS, Driftwood Bay RRS, Cold Bay LRRS, and Port Heiden), specific measures to be implemented to reduce or avoid impacts to sea otters at these sites have not been identified. Therefore, USAF will initiate site-specific consultation with the Service's Anchorage Field Office regarding effects of remediation activities on sea otters at these locations as proposed actions at these sites are developed.

A complete administrative record of this consultation is on file at the Fairbanks Fish and Wildlife Field Office, 101 12th Avenue, Fairbanks, Alaska, 99701. If you have comments or concerns regarding this BO, please contact Ted Swem, Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office at (907) 456-0441.

Sincerely,

Ted Swem

Ted Swem
Branch Chief
Endangered Species

BIOLOGICAL OPINION

For

UNITED STATES AIR FORCE
REMOTE INSTALLATION REMEDIAL ACTIVITY:
2014-2024

Consultation with
U.S. Air Force
611th Civil Engineer Squadron
Joint Base Elmendorf-Richardson, AK

Prepared by:
Fairbanks Fish and Wildlife Field Office
U.S. Fish and Wildlife Service
101 12th Ave, Room 110
Fairbanks, AK 99701

June 2, 2014

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1. INTRODUCTION

This document is the U.S. Fish and Wildlife Service's (Service) final Biological Opinion (BO) on a proposal by the United States Air Force (USAF), to conduct remediation and restoration activities at 31 remote Alaskan short and long range radar stations. This BO describes effects of the proposed activities on spectacled eiders (*Somateria fischeri*), Alaska-breeding Steller's eiders (*Polysticta stelleri*), polar bears (*Ursus maritimus*), northern sea otters (*Enhydra lutris kenyoni*), and the candidate species Yellow-billed loon (*Gavia adamsii*), and Pacific walrus (*Odobenus rosmarus*) pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.). Remedial activities would occur year-round between 2014 and 2024, with most activities concentrated from May through October each year.

We used information provided in USAF's Programmatic Biological Assessment for these activities (USAF 2014), communications with USAF personnel, other Service documents, and published and unpublished literature to develop this BO.

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

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

The Service has determined the proposed action may affect, but is not likely to adversely affect, Steller's eiders or polar bears, and is not likely to jeopardize the continued existence of the yellow-billed loon or Pacific walrus. The Service also determined the proposed action *may adversely affect* threatened spectacled eiders. Following review of the status and environmental baseline of listed eiders, and analysis of potential effects of the proposed action to this species, the Service has concluded the proposed action *is not likely to jeopardize* the continued existence of spectacled eiders.

Although northern sea otters may occur in nearshore marine waters adjacent to some USAF work sites (i.e., Eareckson AS, Nikolski RRS, Driftwood Bay RRS, Cold Bay LRRS, and Port Heiden), specific measures to be implemented to reduce or avoid impacts to sea otters at these sites have not been identified. Therefore, USAF will initiate site-specific consultation with the Service's Anchorage Field Office regarding effects of remediation activities on sea otters at these locations as proposed actions at these sites are developed.

If you have comments or concerns regarding this BO, please contact Ted Swem, Endangered Species Branch Chief, Fairbanks Fish and Wildlife Field Office at (907) 456-0441.

2. DESCRIPTION OF THE PROPOSED ACTION

Project Overview

USAF would conduct remediation and restoration activities at 31 remote Alaskan short and long range radar stations (SRRS and LRRS; Figure 1). Environmental restoration activities would include site investigations, long-term monitoring/management (LTM), remedial action operations (RAO), remedial action construction (RAC), and other activities. The proposed activities would occur year-round between 2014 and 2024, with most activities concentrated from May through October each year.

The proposed restoration activities would include the following specific actions:

- LTM activities:
  - Ground water sampling;
    - Installation of new wells with a drill rig;
    - Long term monitoring and sampling at these wells;
  - Soil sampling;
  - Surface water sampling;
  - Sediment sampling;
  - Installation of institutional controls (ICs) including:
    - Cap conditions;
    - Signs;
  - Compliance with anticipated regulatory requirements;
  - Conducting 5 year reviews;
  - Conducting remedial investigations (RI) and feasibility studies to define and delineate the extent of contamination and compile data to determine if passive or active remedial measures are required, or if regulatory closure can be proposed at a particular site.

LTM equipment would be installed using hand-tools (e.g., hand augers), except where conditions require sampling by motorized concrete coring devices (e.g., concrete installations). Motorized vehicles would be limited to established roads or trails, and on-tundra sites would be accessed by foot. Some sites (e.g., Point Lonely SRRS) would be accessed by barge during open water periods.

- RAO activities:
  - Excavation, treatment (e.g., land spreading and tilling), and or removal of contaminated soil;
  - Removal of debris;
  - Demolition of structures;
  - Site restoration;
  - Installation of groundwater monitoring wells with a drill rig;
  - Decommissioning of groundwater monitoring wells;
  - Conducting biological surveys;
- RAC activities:
  - Repairing caps as necessary;
  - Minor additions of gravel base to remediate the formation of gaps in fencing;
  - Repairing fencing and signs as necessary;

A variety of small to large construction equipment would be used to conduct RAO and RAC efforts. Construction of temporary camps would also be necessary for some projects.

Minimization measures
If any activity were to occur during the nesting season, at an installation where listed eiders could nest (e.g., Point Barrow LRRS, Oliktok Point LRRS, Lonely SRRS, and Wainwright SRRS), USAF would conduct a nesting survey prior to the initiation of work. Service guidelines avoiding disturbance to listed eiders are detailed below (USFWS 2004b). These guidelines were intended to extend five years from the last observed occupation:

- Assess whether spectacled or Steller's eiders would likely to use the project area for nesting or brood-rearing by contacting USFWS for assistance. For projects conducted during the breeding season, a Service-approved survey for spectacled and Steller's eiders should be conducted in the year of construction, prior to initiation of activities.
- If spectacled or Steller's eiders nests are in the project area, the following activities require special permits within 200 m (656 ft) of nest sites;
    - vehicle and foot traffic from May 20 through August 1, except on existing roads;
    - construction of permanent facilities, placement of fill, or alteration of habitat; and,
    - introduction of high noise levels from May 20 through August 1, including but not limited to noise from airports, blasting, and compressor stations.
- Should a listed eider nest be found, the nest would immediately be reported to USFWS, and additional protection measures may be developed, including determinations of what activities may still be able to occur that would not affect the species.
- Nesting surveys for listed eiders would occur from approximately mid-June through the first week of July.

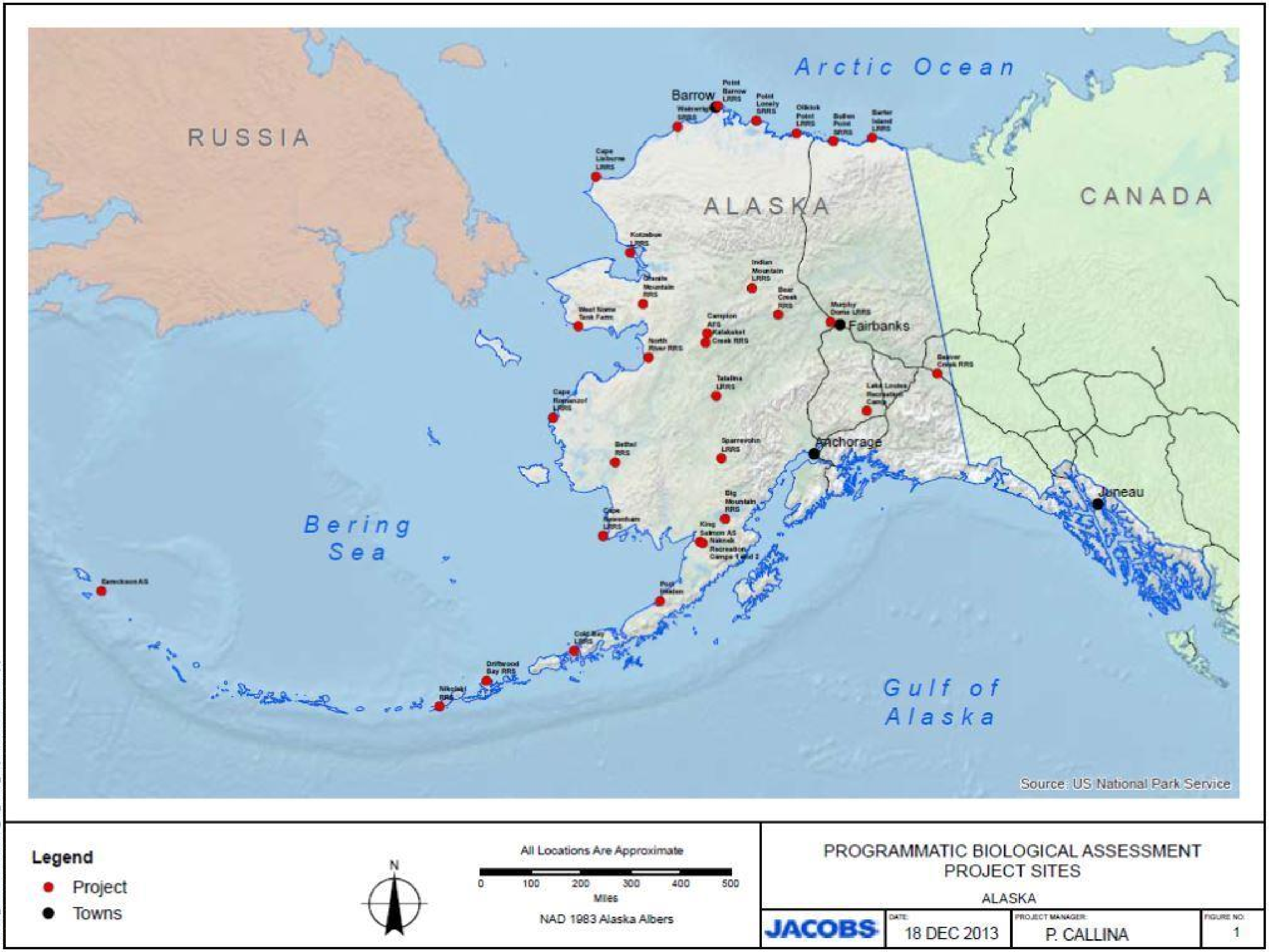

Figure 2.1. Locations of 31 USAF sites in interior and coastal Alaska, where remediation activities would take place between 2014 and 2024.

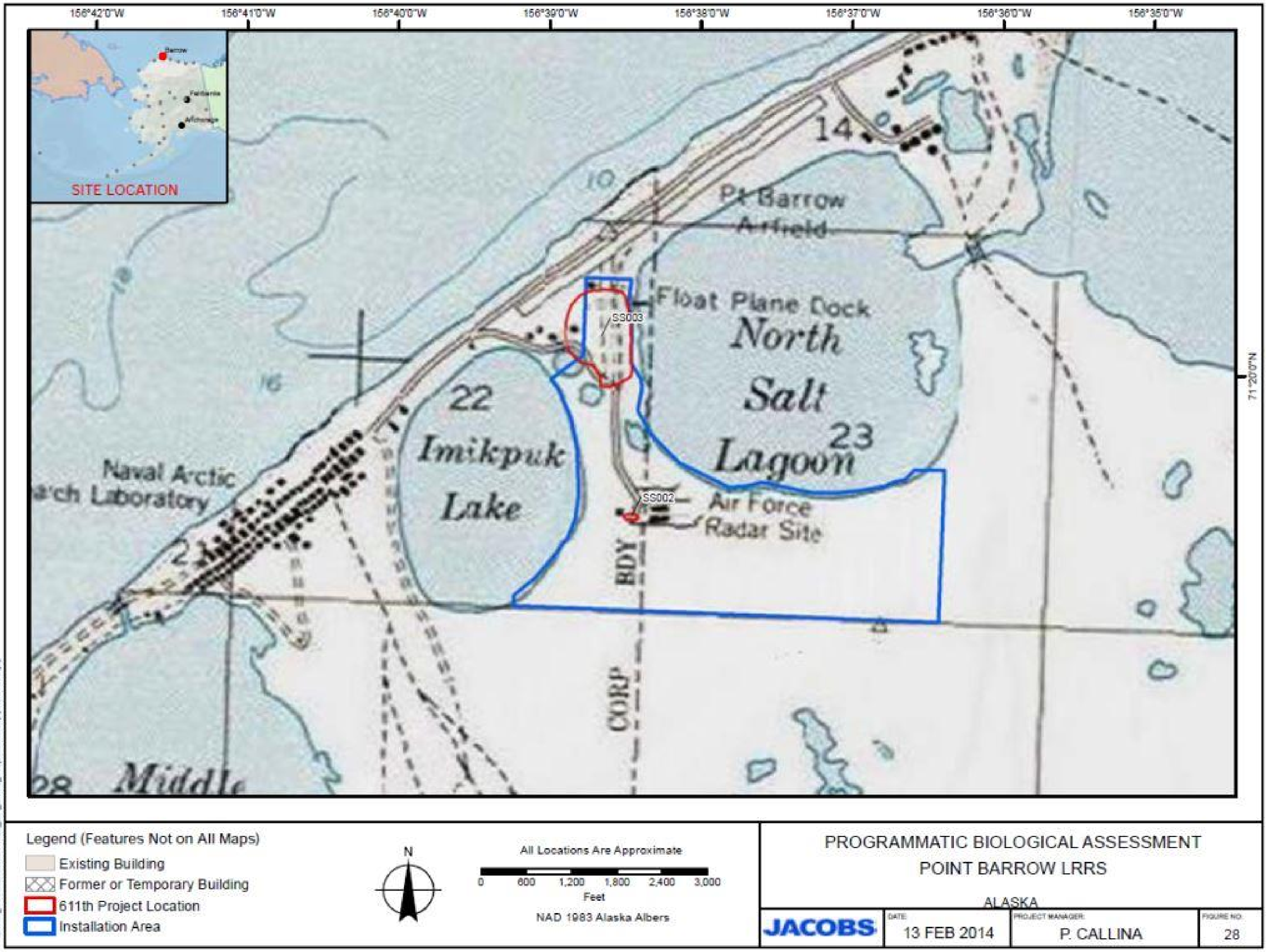

Figure 2.2. Location of the proposed Barrow SRRS remediation sites (SS002 and SS003) northeast of Barrow, Alaska.

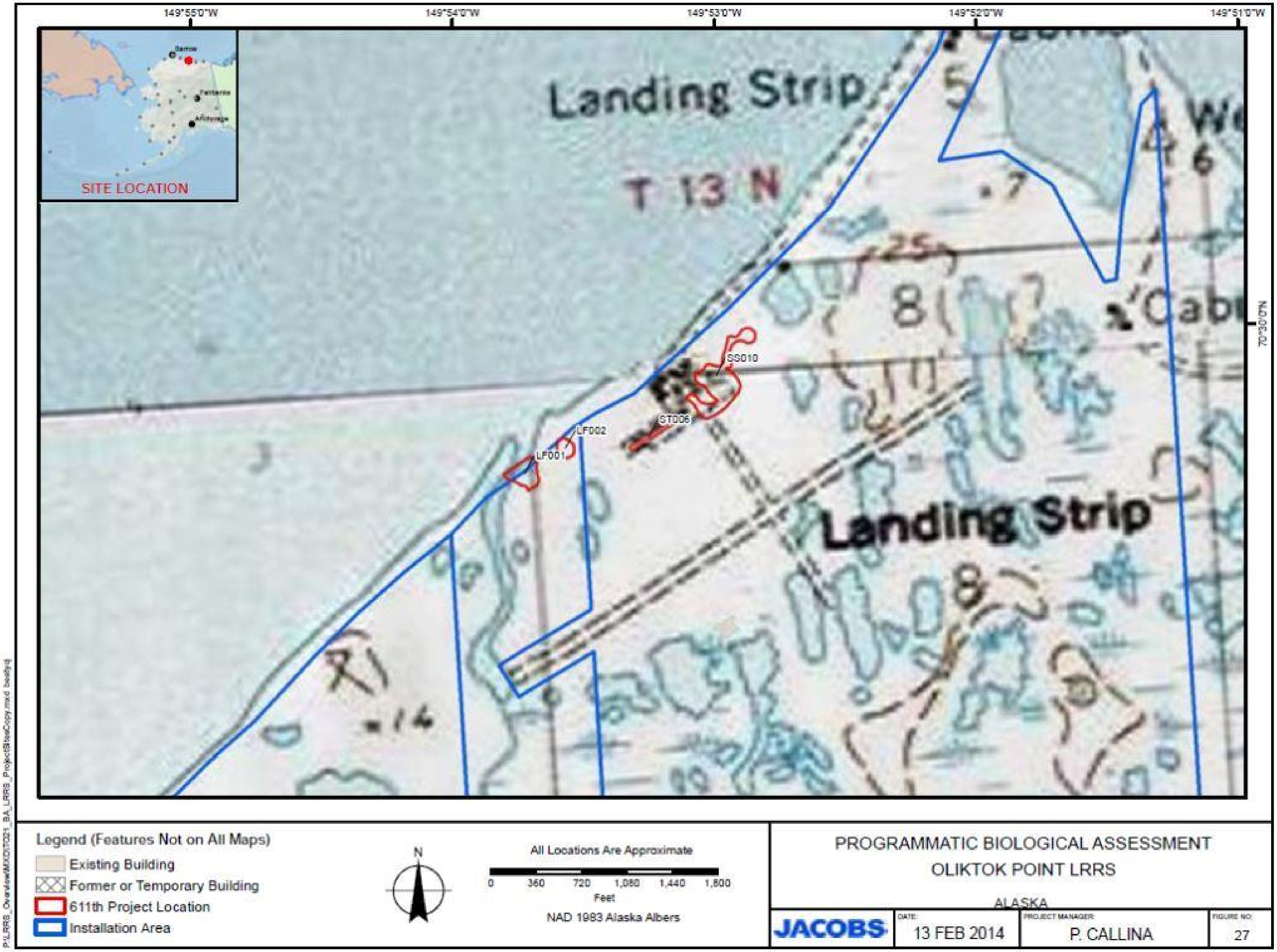

Figure 2.3 Location of the proposed Oliktok Point LRRS remediation sites (LF001, LF002, SS010, and ST 006) approximately 39 mi (63 km) northwest of Deadhorse, Alaska.

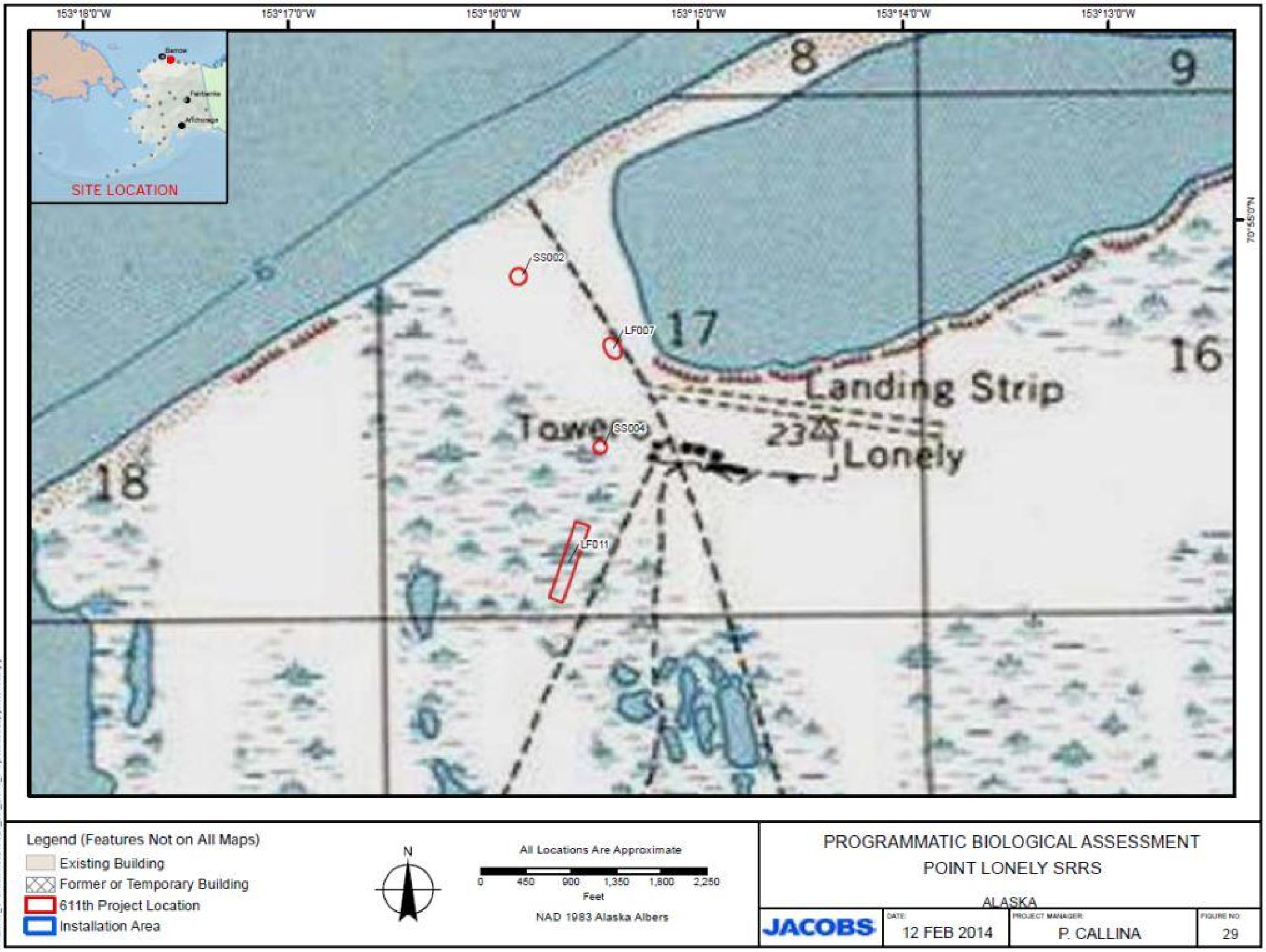

Figure 2.4. Location of the proposed Point Lonely SRRS remediation sites (KF007, LF011, SS002, SS004) approximately 120 mi (193 km) northwest of Deadhorse, Alaska.

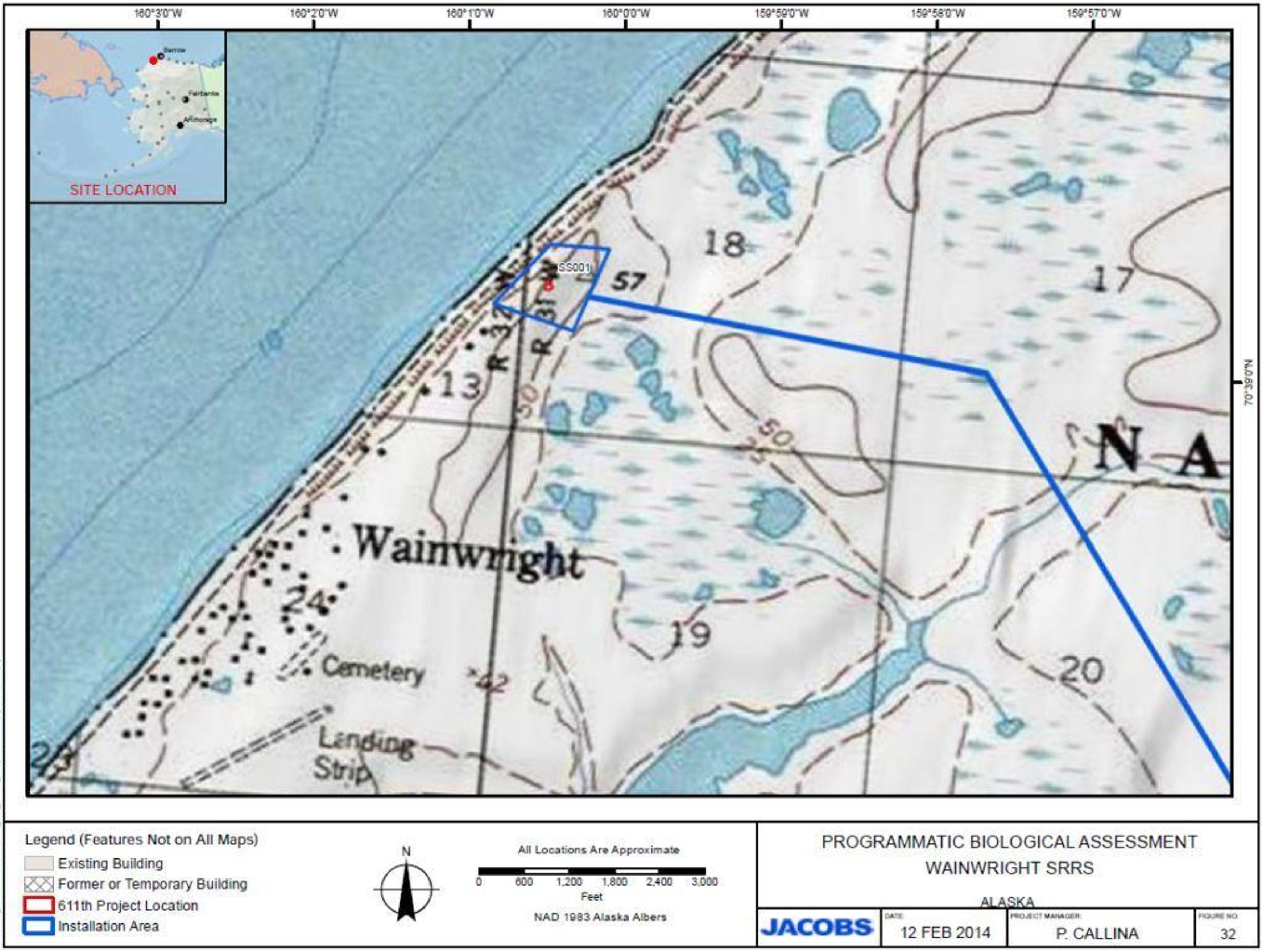

Figure 2.5. Location of the proposed USAF remediation site (SS001) near Wainwright, Alaska.

Action Area

The action area includes the lands and waters (terrestrial and marine) surrounding each installation where the effects of remediation activities (including disturbance) could occur (Figure 2.1). Specifically, these sites are identified as:

- Bear Creek RRS
- Bethel RRS
- Big Mountain RRS
- Cape Lisburne LRRS
- Granite Mountain RRS
- Kalakaket Creek RRS
- Sparrevohn LRRS
- West Nome Tank Farm
- Barter Island LRRS
- Beaver Creek RRS
- Bullen Point SRRS
- Campion AFS
- Cape Newenham LRRS
- Cape Romanzof LRRS
- Cold Bay LRRS
- Driftwood Bay RRS
- Eareckson AS
- Indian Mountain LRRS
- King Salmon AS
- Kotzebue LRRS
- Lake Louise Recreation Camp
- Murphy Dome LRRS
- Naknek Recreation Camps 1 and 2
- Nikolski RRS
- North River RRS
- Oliktok Point RRS
- Point Barrow LRRS
- Point Lonely SRRS
- Port Heiden
- Tatalina LRRS
- Wainwright SRRS

3. EFFECT DETERMINATION FOR ALASKA-BREEDING STELLER'S EIDERS, POLAR BEARS, YELLOW-BILLED LOON, AND PACIFIC WALRUS

Steller's eiders

The Service listed the Alaska-breeding population of the Steller's eider as threatened on June 11, 1997 (62 FR 31748). Steller's eiders can occur between May and September in the Point Barrow LRRS, Oliktok Point LRRS, Point Lonely SRRS, and Wainwright SRRS project areas (Figures 2.2-2.5) although they occur at very low densities, and are currently known to nest regularly only near Barrow.

Direct effects are those that occur when there is an immediate effect on listed species or habitat (e.g., disturbance resulting in nest abandonment). For example, because remediation activities at the Barrow SRRS could take place during the nesting period for listed eiders (June 1 – July 31), disturbance associated with the proposed activities could disturb nesting females or displace Steller's eiders from habitat adjacent to work areas. To estimate effects to eiders nesting in adjacent habitat, we assume disturbance could displace eiders from within 200 meters of human activities. To estimate the likelihood of Steller's eiders occurring within the 200-m disturbance zone, we multiplied the average density of breeding pairs within the USFWS standard survey area 1999-2012 (Safine 2013; 0.262 breeding pairs/km^2 or 0.131 nests/km^2) by the approximate size of the Barrow LRRS disturbance footprint (0.2 km^2). While acknowledging the imprecision of this calculation, we estimate the proposed remediation activities could result in a potential loss in production of 0.26 Steller's eider nests over a 10 year project life. This level of impact, is so minor that appreciable effects to nesting Steller's eiders from disturbance associated with the proposed remediation activities are not anticipated. Therefore, we expect effects of disturbance on Steller's eiders nesting adjacent to the Barrow SRRS site would be insignificant.

Because non-breeding or migrating Steller's eiders could be present in these areas as early as May and as late as September, these birds could also be subject to disturbance from the proposed activities. However, we expect disturbance to non-breeding or migrating eiders would be minor because non-nesting individuals can respond to human presence or disturbance by moving away to a perceived safe distance. Because disturbance to non-breeding or migrating Steller's eiders would be so minor that injury or death is not expected, project effects to these birds would be insignificant.

Because (1) Steller's eider density in these action areas is low; (2) appreciable effects to reproductive eiders are not expected; and (3) effects to non-breeding or migrating eiders would be minor and temporary, we expect effects of the proposed action on Steller's eiders would be insignificant. Therefore, the proposed USAF remediation activities are *not likely to adversely affect* Alaska-breeding Steller's eiders.

Polar bear
The Service listed the polar bear as a threatened species under the ESA on May 15, 2008 (73 FR 28212). Polar bears may occur at the following USAF remediation sites (Figure 2.1):

- Barter Island LRRS
- Bullen Point SRRS
- Cape Lisburn LRRS
- Kotzebue LRRS
- Oliktok Point LRRS
- Point Lonely SRRS
- Point Barrow LRRS
- Wainwright SRRS
- West Nome Tank Farm

Polar bears may occasionally pass through or den in these areas, although their density is low and encounters are expected to be infrequent. Transient (non-denning) bears that enter these action areas could be disturbed by the presence of humans or equipment noise. However, we expect disturbances would be minor and temporary because transient bears would be able to respond to human presence or disturbance by departing the area. Furthermore, personnel would adhere to USAF's *Polar Bear Interaction Management and Pacific Walrus Haulout Avoidance Plan* in the event that a polar bear enters the project area while workers are present.

In addition to transient animals, female polar bears may occasionally den in or near the project areas. However, given that the majority of activities would occur during snow-free months (May through October), effects of the proposed activities on denning polar bears would be unlikely.

Because (1) the density of polar bears in the action area is low; (2) encounters with polar bears are expected to be infrequent; (3) behavioral effects to transient bears would be minor and temporary; (4) mitigation measures included USAF's interaction plan would minimize potential impacts in the event that transient polar bears are encountered; and (5) due to project timing, effects to denning polar bears would be unlikely, we expect effects of the proposed action on polar bears would be insignificant. Therefore, the proposed research activities are *not likely to adversely affect* polar bears.

Yellow-billed loon
On March 25, 2009, the Service designated the yellow-billed loon a candidate for protection under the ESA because of the species' small population range-wide, concerns about levels of subsistence harvest, and other potential impacts to the species (74 FR 12932). Although rare, yellow-billed loons may be present in action areas north of the Brooks Range on the Arctic Coastal Plain (ACP) from early June through September where they nest and rear broods in freshwater tundra ponds and lakes. It is possible some nesting or brooding yellow-billed loons may be disturbed by the proposed remediation activities. While disturbance associated with the proposed activities may cause birds to flush, we expect this response to be insignificant as the disturbance would likely cause minor and temporary changes in behavior that would not result in injury or death to the affected individuals. Because available data indicate yellow-billed loons do not nest in high densities within the action areas, and disturbances to nesting, feeding, or migrating birds would be minor and temporary, the Service concludes that adverse effects of the proposed action would be insignificant. Therefore, the proposed action is *not likely to jeopardize the continued existence* of the yellow-billed loon by reducing appreciably the likelihood of

survival and recovery of this species in the wild by reducing its reproduction, numbers, and distribution.

Pacific Walrus

The Pacific walrus was listed as a candidate species under the ESA with the publication of a 12-month petition finding on February 10, 2011 (USFWS 2011). Pacific walruses may be present in the action areas in off- and near-shore waters as well as at coastal haulouts. Since the mid-1990s reductions in summer sea-ice cover have coincided with increased use of coastal haulouts along the northwest coast of Alaska. Increased use of terrestrial haul-outs in summer by adult females and young could result in increased energy expenditures from shore-based foraging trips and reduced access to preferred feeding grounds (Jay et al. 2011). In addition, disturbance could cause walrus groups to abandon terrestrial haulouts in stampedes that could potentially result in trampling injuries, mortalities, or cow-calf separations. Disturbance events have led to the trampling and death of hundreds of walruses in Alaska and thousands in Russia.

The proposed action includes site access via aircraft and vessels that have the potential to disturb walrus. Responses of walrus to disturbance stimuli are variable although generally, single animals that are hauled out are more sensitive to disturbance than swimming individuals. Disturbance to swimming walrus would likely be minor and temporary because swimming walrus would be able to respond to disturbance by departing the area. However, aircraft or vessel landings at locations that overlap or are adjacent to terrestrial haulouts have the potential to cause stampede abandonment of these sites.

Minimization measures included in USAF's *Polar Bear Interaction Management and Pacific Walrus Haulout Avoidance Plan*, would reduce or avoid potential disturbance to walrus. These measures include:

- If barge landings or other marine operations are required when walrus are present, personnel will wait until walrus have departed and the haulout is clear before bringing vessels to shore;
- Vessels < 100 ft (30.5 m) will remain at least 0.5 mi (0.8 km) away from any hauled-out walrus;
- Vessels > 100 ft (30.5 m) will remain at least 1.0 mi (1.6 km) away from hauled-out walrus;
- Marine operations in the vicinity of walrus haulouts will avoid:
    - sudden changes in engine noise;
    - use of loud speakers;
    - use of loud deck equipment; and,
    - other operations that produce noise; and,
- Vessels will avoid excessive speed, or sudden changes in speed or direction when approaching or departing walrus haulouts.

Furthermore, aircraft access to remediation sites would be limited to established coastal airports or landingstrips. Therefore, we conclude that vessel traffic and flights associated with the proposed activities are not likely to adversely affect walrus.

Because disturbance to swimming walrus would be minor and temporary, and because haul-out avoidance measures adopted by USAF would prevent minimize risk of stampedes at terrestrial haulouts, we conclude that effects of the proposed action would be minor and *would not cause population-level impacts.* Therefore, the proposed action is *not likely to jeopardize the continued existence* of Pacific walrus by reducing appreciably the likelihood of survival and recovery of this species in the wild by reducing its reproduction, numbers, and distribution.

4. STATUS OF THE SPECIES

This section presents biological and ecological information relevant to the BO. Appropriate information on species' life history, habitat and distribution, and other factors necessary for their survival is included as background for subsequent sections.

Spectacled eider

Spectacled eiders (Figure 4.1A) were listed as threatened throughout their range on May 10, 1993 (USFWS 1993) based on indications of steep declines in the two Alaska-breeding populations. There are three primary spectacled eider populations, corresponding to breeding grounds on Alaska's North Slope, the Yukon–Kuskokwim Delta (YK-delta), and northern Russia. The YK-delta population declined 96% between the early 1970s and 1992 (Stehn et al. 1993). Data from the Prudhoe Bay oil fields (Warnock and Troy 1992) and information from Native elders at Wainwright, Alaska (R. Suydam, pers. comm. in USFWS 1996) suggested concurrent localized declines on the North Slope, although data for the entire North Slope breeding population were not available. Spectacled eiders molt in several discrete areas (Figure 4.1B) during late summer and fall, with birds from different populations and genders apparently favoring different molting areas (Petersen et al. 1999). All three spectacled eider populations overwinter in openings in pack ice of the central Bering Sea, south of St. Lawrence Island (Petersen et al. 1999; Figure 4.2), where they remain until March–April (Lovvorn et al. 2003).

Life History

Breeding – In Alaska, spectacled eiders breed primarily on the Arctic Coastal Plain (ACP) and the YK-delta. On the ACP, spectacled eiders breed north of a line connecting the mouth of the Utukok River to a point on the Shaviovik River about 24 km (15 mi) inland from its mouth, with breeding density varying across the ACP (Figure 4.2). Although spectacled eiders historically occurred throughout the coastal zone of the YK-delta, they currently breed primarily in the central coast zone within about 15 km (9 mi) of the coast from Kigigak Island north to Kokechik Bay (USFWS 1996). However, sightings on the YK-delta have also occurred both north and south of this area during the breeding season (R. Platte, USFWS, pers. comm. 1997).

Spectacled eiders arrive on the ACP breeding grounds in late May to early June. Numbers of breeding pairs peak in mid-June and decline 4–5 days later when males begin to depart from the breeding grounds (Smith et al. 1994, Anderson and Cooper 1994, Anderson et al. 1995, Bart and Earnst 2005). Mean clutch size reported from studies on the Colville River Delta was 4.3 (Bart and Earnst 2005). Spectacled eider clutch size near Barrow has averaged 3.2–4.1, with clutches of up to eight eggs reported (Quakenbush et al. 1995, Safine 2011). 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).

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

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

Survivorship – Nest success is highly variable and thought to be primarily influenced by predators, including gulls (*Larus* spp.), jaegers (*Stercorarius* spp.), and red (*Vulpes vulpes*) and arctic foxes (*Alopex lagopus*). In arctic Russia, apparent nest success was estimated to be < 2% in 1994 and 27% in 1995; low nest success was attributed to predation (Pearce et al. 1998). Apparent nest success in 1991 and 1993–1995 in the Kuparuk and Prudhoe Bay oil fields on the ACP was also low, varying from 25–40% (Warnock and Troy 1992, Anderson et al. 1998). On Kigigak Island in the YK-delta, nest survival probability ranged from 6–92% from 1992–2007 (Lake 2007); nest success tended to be higher in years with low fox numbers or activity (i.e., no denning) or when foxes were eliminated from the island prior to the nesting season. Bowman et al. (2002) also reported high variation in nest success (20–95%) of spectacled eiders on the YK-delta, depending on year and location.

(A)

(B)

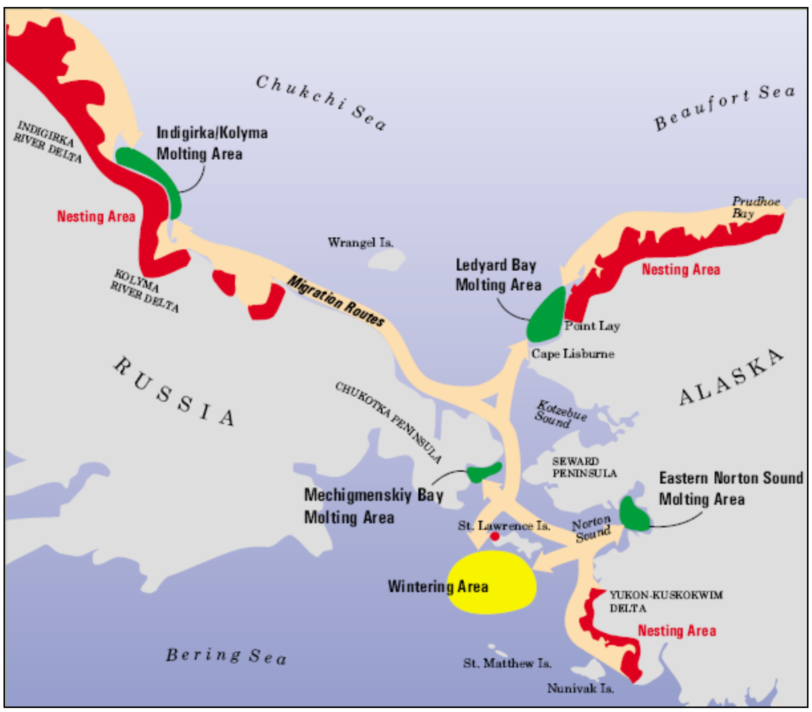

Figure 4.1. (A) Male and female spectacled eiders in breeding plumage. (B) Distribution of spectacled eiders. Molting areas (green) are used July –October. Wintering areas (yellow) are used October –April. The full extent of molting and wintering areas is not yet known and may extend beyond the boundaries shown.

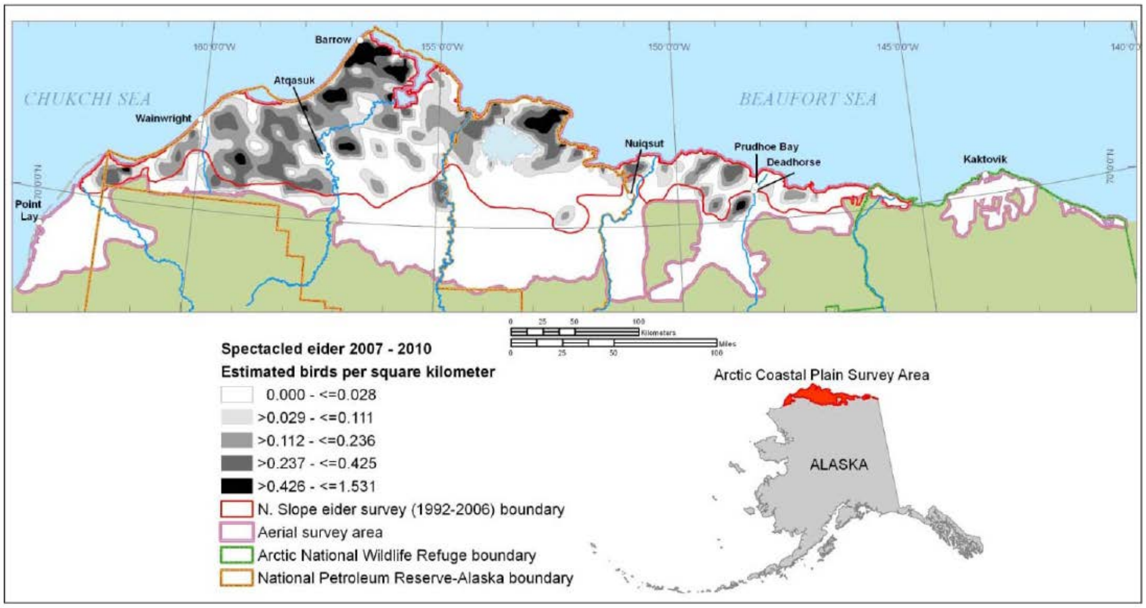

Figure 4.2. Density distribution of spectacled eiders observed on aerial transects sampling 57,336 km^2 of wetland tundra on the North Slope of Alaska during early to mid-June, 2007–2010 (Larned et al. 2011).

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

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

Fall migration and molting – As with many other sea ducks, spectacled eiders spend the 8–10 month non-breeding season at sea. Satellite telemetry and aerial surveys led to the identification of spectacled eider migrating, molting, and wintering areas. These studies are summarized in Petersen et al. (1995 and 1999) and Larned et al. (1995). Results of more recent satellite telemetry research (2008–2011) are consistent with earlier studies (Matt Sexson, USGS, pers.

comm.). Phenology, spring migration and breeding, including arrival, nest initiation, hatch, and fledging, is 3–4 weeks earlier in western Alaska (YK-delta) than northern Alaska (ACP); however, phenology of fall migration is similar between areas. Individuals depart breeding areas July–September, depending on breeding status and success, and molt in September–October (Matt Sexson, USGS, pers. comm.).

Males generally depart breeding areas on the ACP when 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 move rapidly (average travel of 1.75 days), over nearshore waters from breeding grounds to the Chukchi Sea (TERA 2002). Of 14 males implanted with satellite transmitters, only four spent an extended period of time (11–30 days) in the Beaufort Sea (TERA 2002). Males appeared to prefer areas near large river deltas such as the Colville River where open water is more prevalent in early summer when much of the Beaufort Sea is still frozen. Most adult males marked with satellite transmitters in northern and western Alaska in a recent satellite telemetry study migrated to northern Russia to molt (USGS, unpublished data). Results from this study also suggest that male eiders likely follow coast lines but also migrate straight across the northern Bering and Chukchi seas en route to northern Russia (Matt Sexson, USGS, pers. comm.).

Females generally depart the breeding grounds later, when more of the Beaufort Sea is ice-free, allowing 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 males (Petersen et al. 1999). The greater use of the Beaufort Sea and offshore areas by females was attributed to the greater availability of open water when females depart the area (Petersen et al. 1999, TERA 2002). Recent telemetry data indicate that molt migration of failed/non-breeding females from the Colville River Delta through the Beaufort Sea is relatively rapid, 2 weeks, compared to 2–3 months spent in the Chukchi Sea (Matt Sexson, USGS, pers. comm.).

Spectacled eiders use specific molting areas from July to late October/early November. Larned et al. (1995) and Petersen et al. (1999) found spectacled eiders show strong preference for specific molting locations, and concluded that spectacled eiders molt in four discrete areas (Table 4.1). Females generally used molting areas nearest their breeding grounds. All marked females from the YK-delta molted in nearby Norton Sound, while females from the North Slope molted in Ledyard Bay, along the Russian coast, and near St. Lawrence Island. Males did not show strong molting site fidelity; males from all three breeding areas molted in Ledyard Bay, Mechigmenskiy Bay, and the Indigirka/Kolyma River Delta. Males reached molting areas first, beginning in late June, and remained through mid-October. Non-breeding females, and those that nested but failed, arrived at molting areas in late July, while successfully-breeding females and young of the year reached molting areas in late August through late September and remained through October. Fledged juveniles marked on the Colville River Delta usually staged in the Beaufort Sea near the delta for 2–3 weeks before migrating to the Chukchi Sea.

Table 4.1. Important staging and molting areas for female and male spectacled eiders from each breeding population.

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
YK-delta Males	Mechigmenskiy Bay Northeastern Norton Sound
YK-delta Females	Northeastern Norton Sound

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

Wintering – Spectacled eiders generally depart molting areas in late October/early November (Matt Sexson, USGS, pers. comm.), migrating offshore in the Chukchi and Bering seas to a single wintering area in pack-ice lead complexes south/southwest of St. Lawrence Island (Figure 4.1B). In this relatively shallow area, > 300,000 spectacled eiders (Petersen et al. 1999) rest and feed, diving up to 230 ft (70 m) to eat bivalves, other mollusks, and crustaceans (Cottam 1939, Petersen et al. 1998, Lovvorn et al. 2003, Petersen and Douglas 2004).

Spring migration – Recent information indicates spectacled eiders likely 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 observations in the eastern Chukchi Sea have documented dozens to several hundred common eiders (*Somateria mollissima)* and spectacled eiders in spring leads and several miles offshore in relatively small openings in rotting sea ice (W. Larned, USFWS; J. Lovvorn, University of Wyoming, pers. comm.). Woodby and Divoky (1982) documented large numbers of king (*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 spring eider passage in this region. Preliminary results from an ongoing satellite telemetry study conducted by the USGS Alaska Science Center (Figure 4.3; USGS, unpublished data) suggest that spectacled eiders also use the lead system during spring migration.

Adequate foraging opportunities and nutrition during spring migration are critical to spectacled eider productivity. Like most sea ducks, female spectacled eiders do not feed substantially on the breeding grounds, but produce and incubate eggs while living primarily off body reserves (Korschgen 1977, Drent and Daan 1980, Parker and Holm 1990). Clutch size, a measure of reproductive potential, was positively correlated with body condition and reserves obtained prior to arrival at breeding areas (Coulson 1984, Raveling 1979, Parker and Holm 1990). Body reserves must be maintained from winter or acquired during the 4-8 weeks (Lovvorn et al. 2003) of spring staging, and Petersen and Flint (2002) suggest common eider productivity on the western Beaufort Sea coast is influenced by conditions encountered in May to early June during 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), suggesting that spectacled eiders maintain or enhance their physiological condition during spring staging.

Abundance and trends

The most recent rangewide estimate of abundance of spectacled eiders was 369,122 (364,190–374,054 90% CI), obtained by aerial surveys of the known wintering area in the Bering Sea in late winter 2010 (Larned et al. 2012). Comparison of point estimates between 1997 and 2010 indicate an average of 353,051 spectacled eiders (344,147-361956 90% CI) in the global population over that 14-year period (Larned et al. 2012).

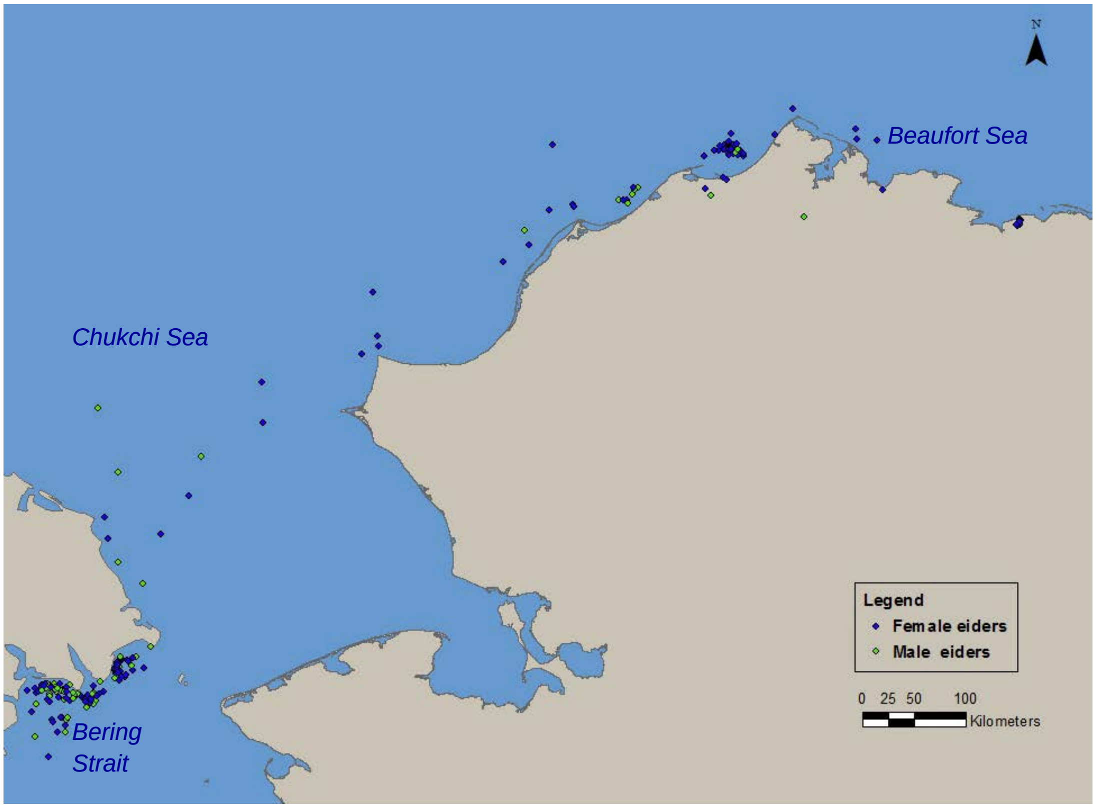

Figure 4.3. Spectacled eider satellite telemetry locations for 12 female and 7 male spectacled eiders in the eastern Chukchi Sea from 1 April – 15 June 2010 and 1 April – 15 June 2011. Additional locations from the northern coast of Russia are not shown. Eiders were tagged on the North Slope during the 2009 and 2010 breeding seasons. Data provided by Matt Sexson, USGS Alaska Science Center (USGS, unpublished).

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

The YK-delta spectacled eider population is thought to have declined by about 96% from the 1970s to 1992 (Stehn et al. 1993). Evidence of the dramatic decline in spectacled eider nesting on the YK-delta was corroborated by Ely et al. (1994), who found a 79% decline in eider nesting near the Kashunuk River between 1969 and 1992. Aerial and ground survey data indicated that spectacled eiders declined 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 YK-delta declined from 48,000 to 2,000, apparently stabilizing at that low level (Stehn et al. 1993). Before 1972, an estimated 47,700–70,000 pairs of spectacled eiders nested on the YK-delta in average to good years (Dau and Kistchinski 1977).

Fischer et al. (2011) used combined annual ground-based and aerial survey data to estimate the number of nests and eggs of spectacled eiders on the coastal area of the YK-delta in 2011 and evaluate long-term trends in the YK-delta breeding population from 1985 to 2011. In a given year, the estimated number of nests reflects the minimum number of breeding pairs in the population and does not include non-nesting individuals or nests that were destroyed or abandoned (Fischer et al. 2011). The total number of spectacled eider nests on the YK-delta in 2011 was estimated at 3,608 (SE 448), the second lowest estimate over the past 10 years. The average population growth rate based on these surveys was 1.049 (90% CI = 0.994–1.105) in 2002–2011 and 1.003 (90% CI = 0.991–1.015) in 1985–2011 (Fischer et al. 2011). Log-linear regression based solely on the long-term YK-delta aerial survey data indicate positive population growth rates of 1.073 (90% CI = 1.046–1.100) in 2001–2010 and 1.070 (90% CI = 1.058–1.081) in 1988–2010 (Platte and Stehn 2011).

Spectacled eider recovery criteria

The Spectacled Eider Recovery Plan (USFWS 1996) presents research and management priorities with the objective of recovery and delisting so that protection under the ESA is no longer required. Although the cause or causes of the spectacled eider population decline is/are 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 YK-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. Under the Recovery Plan, the species will be considered recovered when each of the three recognized populations (YK-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.

5. ENVIRONMENTAL BASELINE

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

Status of spectacled eiders in the action area

Although density of nesting spectacled eiders varies across much of the ACP (Figure 3.2), they regularly breed near Barrow. In the action area, spectacled eiders arrive between late May and early June and may remain as late as mid-October. The channel at the south end of Middle Salt Lagoon is one of the first open-water areas available when eiders arrive in early June, and frequently functions as a staging area until terrestrial and freshwater habitats are snow-free. Multiple observations of spectacled eider breeding pairs in wetland complexes south of the action area suggest they may nest in the area (Figure 5.1). Broods may forage in the action area during late summer and early fall. Factors that may have contributed to the current status of spectacled eiders in the action area include, but are not limited to, environmental contaminants, increased predator populations, incidental harvest, and habitat loss through development and disturbance. Recovery efforts for spectacled eiders are underway in portions of the action area.

Environmental contaminants

Deposition of lead shot in tundra wetlands and shallow marine habitat where eiders forage is considered a threat to listed eiders. Lead poisoning of spectacled eiders has been documented on the Y-K Delta (Franson et al. 1995, Grand et al. 1998) and in Steller's eiders on the ACP (Trust et al. 1997; Service unpublished data). Steller's eider hens nesting near Barrow in 1999 had blood-lead concentrations suggesting exposure to lead (> 0.2 ppm lead), and six of seven individuals had blood-lead concentrations indicating poisoning (> 0.6 ppm lead). Subsequent isotope analysis confirmed lead in the Steller's eider blood was of lead shot origin, rather than a natural source (Matz, USFWS, unpublished data). Waterfowl hunting with lead shot is prohibited in Alaska, and for all birds on the North Slope. Although the Service reports use of lead shot appears to be declining residual lead shot will presumably be present in the environment, and available to waterfowl, for some unknown period into the future.

Other contaminants, including petroleum hydrocarbons from local sources or globally distributed heavy metals, may also affect spectacled eiders. For example, spectacled eiders wintering near St. Lawrence Island exhibited high concentrations of metals as well as subtle biochemical changes (Trust et al. 2000). Additionally, spectacled eiders breeding and staging on the Colville River Delta may have experienced a variety of exposure to petroleum hydrocarbons, heavy metals, and other contaminants from nearby industrial development. However, risk of contaminant exposure and potential affects to spectacled eiders in the action area are unknown.

Increased predator populations
Poor breeding success of listed eiders near Barrow has been partially attributed to high predation rates (Obritschkewitsch et al. 2001). Predator and scavenger populations have likely increased near villages and industrial infrastructure on the ACP in recent decades (Eberhardt et al. 1983, Day 1998, Powell and Bakensto 2009). Reduced fox trapping, anthropogenic food sources in villages, and an increase in availability of nesting/denning sites at human-built structures may have resulted in increased numbers of arctic foxes (*Vulpes lagopus*), common ravens (*Corvus corax*), and glaucous gulls (*Larus hyperboreus*) in developed areas of the ACP (Day 1998). For example, ravens are highly efficient egg predators (Day 1998), and have been observed depredating Steller's eider nests near Barrow (Quakenbush et al. 2004). Ravens also appear to have expanded their breeding range on the ACP by using manmade structures for nest sites (Day 1998). Therefore, as the number of structures and anthropogenic attractants associated with development increase, nest success of spectacled eiders may be affected, at least at the individual level.

Incidental harvest
Although local knowledge suggests spectacled eiders were not specifically targeted for subsistence, an unknown level of incidental harvest of both species occurred across the North Slope prior to listing spectacled and Steller's eiders under the ESA (Braund et al. 1993). All harvest of spectacled and Steller's eiders was closed in 1991 by Alaska State regulations and Service policy, and outreach efforts have been conducted by the Service, BLM, and North Slope Borough to encourage compliance. However, annual harvest data indicate that at least some spectacled eiders continue to be taken during subsistence activities on the North Slope. Ongoing efforts to help subsistence users avoid harvest are being implemented in North Slope villages, particularly at Barrow, where risk to spectacled eiders results from their presence in or migration through areas commonly used for hunting. Annual intra-service consultations are conducted for the Migratory Bird Subsistence Hunting Regulations, and although estimates are imprecise, harvest of all migratory bird species, including spectacled eiders, is reported regularly.

Habitat loss
Destruction or modification of eider nesting habitat on the North Slope has been limited, and is not believed to have contributed to population declines of spectacled eiders. However, in recent decades development, with associated human presence, and disturbance has rendered some previously used nesting habitat unsuitable.

The human population of Barrow is increasing, and population growth is projected to continue at approximately 2% per annum until at least the middle of this century (BLM 2007). Assuming community infrastructure grows at roughly the same pace, the Barrow footprint could cover approximately 3,600 acres (14.6 km^2) by the 2040s (BLM 2007). In addition, oil and gas development has progressed westward across the ACP towards the National Petroleum Reserve – Alaska (NPR-A) and given industry interest in NPR-A, expressed in lease sales, seismic surveys, and exploratory wells, westward expansion of industrial development is likely to continue. However, potential effects of predicted community and industry expansion on spectacled eiders is difficult to predict.

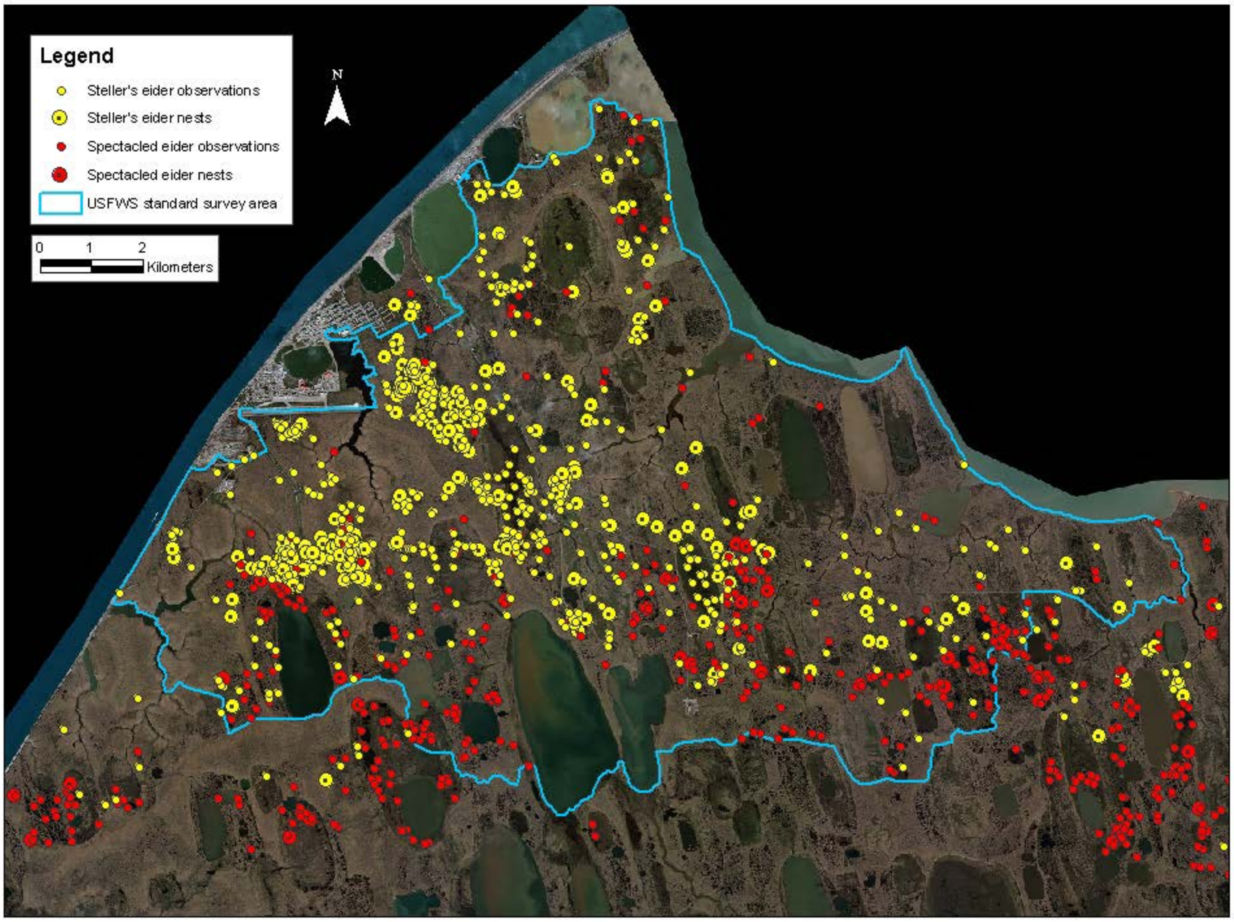

Figure 5.1. Observations of Steller's eiders and spectacled eiders during USFWS breeding pair and nest foot surveys at Barrow, AK (1999–2010; Steller's eider nest locations 1991–2010).

Research

Field-based scientific research has also increased on the ACP in response to interest in climate change and its effects on Arctic ecosystems. While some activities have no impact on spectacled eiders (e.g., project timing occurs when eiders are absent, or employs remote sensing tools), on-tundra activities and remote aircraft landings may disturb spectacled eiders. Many of these activities are considered in intra-Service consultations, or under a programmatic consultation with the BLM for summer activities in NPR-A.

Regional activities requiring formal section 7 consultation

Recent activities in the vicinity of Barrow, Alaska that required formal section 7 consultation, and associated estimated incidental take of spectacled eiders, were considered in the final jeopardy analysis of this biological opinion. The majority of take estimates may be attributed to collisions, disturbance, and habitat loss, although some research projects involve take of adults or eggs (most non-lethal) through capture or handling. In considering the number and diversity of actions that have required consultation in the region, we believe these consultations have overestimated, probably substantially, actual take. Take occurs over the life of a project, and in most cases is in the form of potential loss of eggs/ducklings, which we expect to have low potential for population-level effects (for further discussion see *Effects of the Action on Spectacled Eiders*).

Climate change

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

There are a wide variety of changes occurring across the circumpolar Arctic. Arctic landscapes are dominated by freshwater wetlands (Quinlan et al. 2005), which spectacled eiders depend on for forage and brood rearing. As permafrost thaws, some water bodies are draining (Smith et al. 2005, Oechel et al. 1995), or drying due to increased evaporation and evapotranspiration during prolonged ice-free periods (Schindler and Smol 2006, and Smol and Douglas 2007). In addition, productivity of some lakes and ponds is increasing in correlation with elevated nutrient inputs from thawing soil (Quinlan et al. 2005, Smol et al. 2005, Hinzman et al. 2005, and Chapin et al. 1995) and other changes in water chemistry or temperature are altering algal and invertebrate communities, which form the basis of the Arctic food web (Smol et al. 2005, Quinlan et al. 2005).

With reduced summer sea ice coverage, the frequency and magnitude of coastal storm surges has increased. During these events, coastal lakes and low lying wetlands are often breached, altering soil/water chemistry as well as floral and faunal communities (USGS 2006). When coupled with softer, semi-thawed permafrost, reductions in sea ice have significantly increased coastal erosion rates (USGS 2006), which may reduce available coastal tundra habitat over time.

Changes in precipitation patterns, air and soil temperatures, and water chemistry are also affecting terrestrial communities (Hinzman et al. 2005, Prowse et al. 2006, Chapin et al. 1995), and the range of some boreal vegetation species is expanding northward (Callaghan et al. 2004). Climate-induced shifts in distributions of predators, parasites, and disease vectors may also have significant effects on listed and un-listed species. Climate change may also cause mismatched phenology between spectacled eider migration, development of tundra wetland invertebrate stocks, fluctuation of small mammal populations, and corresponding abundance of predators (Callaghan et al. 2004, Quakenbush and Suydam 1999).

While the impacts of climate change are on-going and the ultimate effects on spectacled eiders within the action area are unclear, species with small populations are more vulnerable to the impacts of environmental change (Crick 2004). Some species may adapt and thrive under changing environmental conditions, while others decline or suffer reduced biological fitness.

6. EFFECTS OF THE ACTION ON SPECTACLED EIDERS

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

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

Effects to spectacled eiders

Adverse effects to spectacled eiders could occur through direct and indirect disturbance. In the discussion below, we provide an assessment of potential loss of spectacled eider production resulting from disturbance associated with the proposed activities at Point Barrow LRRS, Oliktok Point LRRS, Point Lonely SRRS, and Wainwright SRRS.

Loss of production of spectacled eiders

Loss of production through disturbance could occur directly or indirectly. If spectacled eiders nest adjacent to USAF remediation sites, direct loss of production could occur if nests are disturbed or abandoned as a result of human presence. Indirect loss of production may occur through displacement of eiders from the surrounding areas affected by disturbance at remediation sites. Assuming this affect may extend over roughly 200 m, the area encompassed by the zone of influence, or the total disturbance area, is estimated to be 417.43 acres (2.12 km^2). This estimate is likely conservative (i.e., biased high) because fewer eiders may nest in the area given the proximity to existing infrastructure and human disturbance.

Spectacled eider density polygons constructed from data collected during the 2007–2010 waterfowl breeding population survey of the ACP (Larned et al. 2011) provide our best estimate of spectacled eider nest density in the action area. These estimates were developed at a coarse regional scale and are not site- or habitat-specific; however, they reflect the best available data on the density of breeding spectacled eiders in the action area. Distribution on a local scale may vary based on the availability of preferred habitats. Median spectacled eider densities in the areas of Barrow, Oliktok, Point Lonely, and Wainwright were 0.98, 0.014, 0.07, and 0.56

birds/km^2 respectively (Larned et al. 2011). To estimate the potential number of spectacled eider pairs displaced by the proposed remediation activities at these sites, we multiplied the median estimated density in these areas by the estimated affected footprint of each area (2.12 km^2 total). We assume the estimated number of pairs displaced is equivalent to the number of nests or broods that may be affected. We also assume that spectacled eiders will be present and attempt to nest annually in these action areas. Finally, we assume that displaced pairs will not move and successfully nest elsewhere, which is an unproven and conservative assumption. Applying these assumptions and this logic, we estimate the proposed action would cause the loss of 1 spectacled eider nest with eggs during 2014-2024 remediation activities.

0.979 birds/km^2 × 0.5 nests/pair × 0.20 km^2 × 10 yrs =	0.96 nests Barrow
0.056 birds/km^2 × 0.5 nests/pair × 0.84 km^2 × 10 yrs =	0.23 nests Point Lonely
0.070 birds/km^2 × 0.5 nests/pair × 0.39 km^2 × 10 yrs =	0.14 nests Wainwright
0.014 birds/km^2 × 0.5 nests/pair × 0.35 km^2 × 10 yrs =	+0.03 nests Oliktok
	1.36 nests total

Loss of eggs from nests is of much lower significance for survival and recovery of the species than death of reproductive adults. Furthermore, when hatching success (which includes inviable eggs, as well as those lost to predation), brood survival, over-winter survival, and annual survival are taken in context, we estimate roughly that only 1-7 out of 100 spectacled eider eggs laid on the Y-K Delta would survive to enter the breeding population as adults (Grand and Flint 1997, Flint et al. 2000, Grand et al. 1998, and Flint pers. comm). Similarly, we would expect only a small proportion of spectacled eider eggs or ducklings hatched on the North Slope to survive to recruit into the breeding population.

Because the most recent population estimate for North Slope-breeding spectacled eiders is 14,814 (13,501–16,128, 90% CI; Stehn et al. 2013), and recruitment into the breeding population is very low, we would not anticipate population level effects from the loss of 1 nest with eggs as a result of disturbance associated with the proposed remediation activities.

Interrelated and Interdependent Actions

Interdependent actions are defined as “actions having no independent utility apart for the proposed action,” while interrelated actions are defined as “actions that are part of a larger action and depend upon the larger action for their justification” (50 CFR §402.02). The Service has not identified any actions that are interrelated or interdependent to the Proposed Action. Similar activities at other remediation sites are not dependent on USAF projects for their justification (they are not interrelated actions) and have independent utility apart from the Proposed Action (they are not interdependent actions).

7. CUMULATIVE EFFECTS

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

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

8. CONCLUSION

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

Spectacled eiders

In evaluating impacts of the proposed project to listed eiders, the Service identified direct and indirect adverse effects that could result from disturbance. Using methods explained in the *Effects of the Action* section, the Service estimates the loss of up to 1 spectacled eider nest during the USAF 2014-2024 remediation activities. However, we expect this loss of production will not have a significant effect at the population level because only a small proportion of listed eider eggs or ducklings on the North Slope would eventually survive to recruit into the breeding population.

Given that the potential loss in production from the proposed action is a very small proportion of the production of the North Slope-breeding population of spectacled eiders (estimated 13,501–16,128, 90% CI; Stehn et al. 2013), we believe the effects of the proposed USAF remediation activities will not significantly affect the likelihood of survival and recovery of spectacled eiders. After reviewing the current status of the species, the environmental baseline, and effects of the proposed action, the Service concludes that the proposed action is *not likely to jeopardize the continued existence* of the spectacled eider by reducing appreciably the likelihood of survival and recovery in the wild by reducing reproduction, numbers, or distribution of these species.

Future consultation

This BO's determination of non-jeopardy is based on the assumption that USAF and their agents will consult with the Service on future activities related to USAF remediation that are not evaluated in this document. Specifically, proposed actions at Eareckson AS, Nikolski RRS, Driftwood Bay RRS, Cold Bay LRRS, and Port Heiden require project-by-project review by the Service's Anchorage Field Office to evaluate potential impacts to sea otters.

In addition to listed eiders, the area affected by USAF remediation activities may now or hereafter contain plants, animals, or their habitats determined to be threatened or endangered. The Service, through future consultation may recommend alternatives to future actions within the project area to prevent activity that will contribute to a need to list such a species or their habitat. The Service may require alternatives to proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of designated or proposed critical habitat. The Federal action agencies should not authorize any activity that may affect such species or critical habitat until it completes its obligations under applicable requirements of the ESA as amended (16 U.S.C. 1531 et seq.), including completion of any required procedure for conference or consultation.

9. INCIDENTAL TAKE STATEMENT

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

USAF has a continuing duty to regulate the activity covered by this ITS. If USAF (1) fails to assume and implement the terms and conditions or (2) fails to require any applicant to adhere to the terms and conditions of the ITS through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse.

Listed eiders

As described in *Effects of the Action*, the activities described and assessed in this BO may adversely affect listed eiders through direct and indirect disturbance associated with USAF remediation activities. Methods used to estimate loss of listed eider production from disturbance are described in the *Effects of the Action* section. Based on these estimates, the Service anticipates the *loss of production of 1 potential spectacled eider nest with eggs* a result of disturbance resulting from the proposed action.

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

10. CONSERVATION RECOMMENDATIONS

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

1. While collisions between listed eiders and project structures are not anticipated, the Service recommends reporting all sea duck collisions to the Endangered Species Branch, Fairbanks Fish and Wildlife Field Office to improve our understanding of collision risks to eiders in the project area. Contact Shannon Torrence at 907-455-1871 for information on how to report bird collisions.

2. In order to better understand common raven activity in the vicinity of human developments, the Service recommends reporting any raven nests to the Endangered Species Branch, Fairbanks Fish and Wildlife Field Office as soon as they are discovered.

11. REINITIATION NOTICE

This concludes formal consultation for proposed USAF remediation activities between 2014 and 2024. 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 for listed eiders is exceeded;
    a. More than 1 spectacled eider nest taken over the life of the project;
2. New information reveals effects of the action that may affect listed species in a manner or to an extent not considered in this opinion;
3. The project description is subsequently modified in a manner that causes an effect to listed species or critical habitat not considered in this opinion; or
4. A new species is listed or critical habitat is designated that may be affected by the action.

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