U.S. Fish & Wildlife Service

INTRA-SERVICE BIOLOGICAL OPINION
For
Migratory Game Bird Hunting Regulations

Division of Migratory Bird Management

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Intra-service Section 7 Biological Opinion Migratory Bird Hunting Regulations

U.S. Department of the Interior Fish and Wildlife Service
Division of Migratory Bird Management

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1.0 INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) for the 2023-2024 through 2037-2038 Migratory Game Bird Hunting season regulations, including Indian Tribal special seasons, for any possible effects to endangered, threatened, proposed, and candidate species in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA or Act).

The Service concludes that there are potential adverse effects to the endangered whooping crane (*Grus americana*), and the threatened Alaska-breeding Steller's eider (*Polysticta stelleri*) and spectacled eider (*Somateria fischeri*). This Biological Opinion is valid for the 2023-24 through the 2037-38 migratory bird hunting regulation seasons unless the emergency closure clause is enacted or if any of the reinitiation triggers set forth 50 CFR §402.16 are met. It is the Service's biological opinion that the proposed 2023-24 through 2037-38 regulations will not jeopardize the continued existence of the whooping crane, Steller's eider, or spectacled eider or adversely modify or destroy their designated critical habitat. However, we conclude that the proposed regulations have the potential to cause some incidental take of whooping cranes, Steller's eiders, and spectacled eiders.

Based upon Regional Office comments, the proposed regulations are not likely to adversely affect the following species or their critical habitat: akiapolaau, Attwater's greater prairie-chicken, Audubon's crested caracara, black-capped vireo, black-capped petrel cactus ferruginous pygmy-owl*, California clapper rail, California condor*, coastal California gnatcatcher*, California least tern, Canada lynx, Cape Sable sparrow*, eastern black rail, Eskimo curlew, Everglade snail kite*, Florida grasshopper sparrow, Florida scrub jay, greater sage-grouse, golden-cheeked warbler, Hawaii creeper, Hawaiian goose, Inyo California towhee*, Ivory-billed woodpecker, Kirtland's warbler, least Bell's vireo*, least tern (Interior population), lesser prairie-chicken, light-footed clapper rail, marbled murrelet*, masked bobwhite quail, Mexican spotted owl*, Mississippi sandhill crane*, northern aplomado falcon, northern spotted owl*, palila, piping plover (Atlantic Coast population), piping plover* (Great Lakes population), piping plover* (Northern Great Plains population), Puerto Rican broad-winged hawk, Puerto Rican nightjar, Puerto Rican parrot, Puerto Rican plain pigeon, Puerto Rican sharp-shinned hawk, red-cockaded woodpecker, red-knot, roseate tern, short-tailed albatross, southwestern willow flycatcher*, spectacled eider*, streaked horned lark*, western snowy plover*, wood stork, yellow-billed loon, yellow- shouldered blackbird*, and Yuma clapper rail (* Asterisk denotes a species for which critical habitat has been designated). The rationale substantiating these findings is contained in Appendix A.

This BO is based on information provided from Regions 1 through 8, the proposed rules for 2023–24 migratory bird hunting [87 FR 66247, 88 FR 6054, and 88 FR 17511], the BO for the final rule for the 2019-20, 2020-21, 2021-22, and 2022-23 migratory bird hunting seasons, and information and comments submitted to the Division of Migratory Bird Management (DMBM) regarding listed species from the Service's Regional Directors in Regions 1 through 8.

1.1 CONSULTATION HISTORY

November 3, 2022 – DMBM publishes Migratory Bird Hunting proposal to amend 50 CFR part 20; Proposed 2023-24 Migratory Game Bird Hunting Regulations (Preliminary).
January 30, 2023 – DMBM publishes Migratory Bird Hunting proposal to amend 50 CFR part 20; Proposed 2023-24 Frameworks for Migratory Bird Hunting Regulations.
February 23, 2023 – DMBM provides a copy of the draft Biological Opinion to Ecological Services for their review and comment.
March 23, 2023 –DMBM publishes Migratory Bird Hunting proposal to amend 50 CFR part 20; Migratory Game Bird Hunting Regulations on Certain Federal Indian Reservation and Ceded Lands.
March 30, 2023 – DMBM receives comments on the draft Biological Opinion from Ecological Services.
March 31, 2023 – DMBM incorporates comments into the final Biological Opinion and forwards for approval.

2.0 DESCRIPTION OF PROPOSED ACTION

2.1 BACKGROUND

Section 7(a)(2) of the Act 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 Action described in this document, the action agency is the Division of Migratory Bird Management of the U.S. Fish and Wildlife Service, and consultation is being conducted with the Endangered Species Branches in Regions 1-8. This section of the Biological Opinion describes activities that may occur as a result of promulgating migratory bird hunting regulations.

2.2 PROPOSED ACTION

The taking of migratory birds is expressly prohibited under the Migratory Bird Treaty Act (16 U.S.C. 703–12) unless specifically provided by regulation. The Service's DMBM proposes to establish annual hunting regulations for certain migratory game birds. These regulations will permit the hunting of designated species of the avian families Anatidae, Columbidae, Gruidae, Rallidae, and Scolopacidae. These hunting regulations establish the frameworks (hunting zones, dates and season lengths, bag and possession limits, hunting hours, and special seasons, including falconry seasons) within which the States may establish their annual migratory bird hunting programs. The Service regulates the earliest and latest dates within which States can select hunting seasons. Most hunting season dates occur between September 1 and January 31, except geese and limited Tribal seasons which can extend to March 10.

Open hunting seasons occur in the contiguous United States, Alaska, Hawaii, Puerto Rico, and the Virgin Islands. Seasons are divided into early and late seasons for administrative and biological reasons. Early seasons generally begin around September 1 and pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g., doves); and special early waterfowl seasons, such as those for teal (blue-winged [*Anas discors*], green-winged [*A. carolinensis*], and cinnamon [*A. cyanoptera*]) or resident Canada geese (*Branta canadensis*). Late seasons generally start near September 24 and include most waterfowl seasons not already established.

In 1985, the Service developed interim guidelines to establish special migratory game bird hunting regulations on Federal Indian reservations (including off-reservation trust lands) and ceded lands (hereinafter referred to as guidelines). The interim guidelines were published in the Federal Register (FR) on June 4, 1985 (50 FR 23467), with final guidelines published on August 18, 1988 (53 FR 31612). The guidelines were developed in response to Tribal requests for the Service’s recognition of their reserved hunting rights, and for some Tribes, recognition of their authority to regulate hunting by both Tribal and nontribal members throughout their reservations.

Each year from the 1985–86 hunting season through the 2022–2023 hunting season, Tribes wishing to establish special migratory bird hunting regulations on Federal Indian reservations,

including off-reservation trust lands and ceded lands, were required to submit proposed regulations, developed following the guidelines, and anticipated harvest to the Service in the previous summer or fall. The Service would review the Tribes proposal and once approved would publish the regulations in the FR as a proposed rule in the following spring and as a final rule in the fall prior to the opening of hunting season.

Beginning with the 2023–2024 hunting season, Tribes will no longer need to submit proposed migratory bird hunting regulations (and associated monitoring, anticipated harvest, and capabilities for regulation development and enforcement) to the Service for review and approval. Along with this action, FR notices of the annual Tribal Migratory Bird Hunting Regulations will no longer be published. Under this rulemaking, the Service would adopt elements of the guidelines as regulations. Therefore, Tribes wanting to establish special migratory bird hunting regulations would need to comply with the regulations to be authorized to independently establish special Tribal migratory bird hunting regulations. Alternatively, Tribes may choose to observe the hunting regulations established by the State or States in which their reservation is located.

Since 2001, the Service and partners have also established Alaska Subsistence Migratory Bird Harvest Seasons. The establishment of these seasons is conducted as part of our annual Migratory Bird Hunting Regulations Process; however, an Intra-service BO is conducted separate to this consultation (USFWS 2021a). Significant harvest and documentation of Steller's eider shooting mortality on the Arctic Coastal Plain (ACP) during the Alaska Subsistence Harvest Seasons were documented in 2007 and 2008. Because of that information, the Service developed a new regulation for the Alaska Subsistence Harvest during the 2009 season and a suite of Conservation Measures designed to curtail shooting mortality of listed eiders on the ACP (see Section 5.2.5, Conservation Measures to Reduce Risk of Harvest). The Conservation Measures were implemented during the 2009 spring/summer subsistence harvest and have been continued and enhanced during the most recent 2022 spring/summer subsistence season; their implementation during the spring/summer subsistence harvest and the 2022-23 Migratory Bird Hunting Season were considered in this consultation.

All parts of 50 CFR part 20 are part of the proposed action, including the emergency closure clause (§ 20.26) which states:

"(a) The Director may close or temporarily suspend any season established under subpart K of this part: (1) Upon a finding that a continuation of such a season would constitute an imminent threat to the safety of any endangered or threatened species or other migratory bird populations. (2) Upon issuance of local public notice by such means as publication in local newspapers of general circulation, posting of the areas affected, notifying the State wildlife conservation agency, and announcement on local radio and television."

Hunting of any species that is protected under the ESA is not authorized. As a matter of policy, the DMBM also includes species that have been designated as candidates for protection under the ESA in this consultation.

In addition to the measures described above, DMBM addressed lead poisoning in waterfowl in an Environmental Impact Statement (EIS) in 1976, and again in a 1986 supplemental EIS. The 1986 document justified a ban on the use of lead shot to hunt waterfowl. The subsequent approval of steel shot for hunting waterfowl and coots began that year, with a complete ban of lead for waterfowl and coot hunting in 1991. Subsequent to this ban, DMBM published final rules for approval of nontoxic shot types for hunting waterfowl and coots (Table 1).

Table 1. USFWS, DMBM Approved Nontoxic Shot Types for Hunting Waterfowl and Coots

Approved Shot Type[1]	Percent Composition by Weight	Field Testing Device[2]
Bismuth-tin	97 bismuth and 3 tin	Hot Shot®[3]
Iron (steel)	Iron and carbon	Magnet or Hot Shot®
Iron-tungsten	Any proportion of tungsten and ≥ 1 iron	Magnet or Hot Shot®
Iron-tungsten-nickel	≥ 1 iron, any proportion of tungsten, and up to 40 nickel	Magnet or Hot Shot®
Copper-clad iron	84 to 56.59 iron core, with copper cladding up to 44.1 of the shot mass	Magnet or Hot Shot®
Corrosion-inhibited Copper	≥ 99.9 copper with benzotriazole and thermoplastic fluorescent powder coatings	Ultraviolet Light
Tungsten-bronze	51.1 tungsten, 44.4 copper, 3.9 tin, and 0.6 iron, Or 60 tungsten, 35.1 copper, 3.9 tin, and 1 iron	Rare Earth Magnet
Tungsten-iron-copper-nickel	40-76 tungsten, 10-37 iron, 9-16 copper, and 5-7 nickel	Hot Shot® or Rare Earth Magnet
Tungsten-matrix	95.9 tungsten, 4.1 polymer	Hot Shot®
Tungsten-polymer	95.5 tungsten, 4.5 Nylon 6 or 11	Hot Shot®
Tungsten-tin-iron	Any proportions of tungsten and tin, and ≥ 1 iron	Magnet or Hot Shot®
Tungsten-tin-bismuth	Any proportions of tungsten, tin, and bismuth	Rare Earth Magnet
Tungsten-tin-iron-nickel	65 tungsten, 21.8 tin, 10.4 iron, and 2.8 nickel	Magnet
Tungsten-iron-polymer	41.5-95.2 tungsten, 1.5-52.0 iron, and 3.5-8.0 fluoropolymer	Rare Earth Magnet or Hot Shot®

[1] Coatings of copper, nickel, tin, zinc, zinc chloride, zinc chrome, fluoropolymers, and fluorescent thermoplastic on approved nontoxic shot types are approved.
[2] The information in the "Field Testing Device" column is strictly informational, not regulatory.
[3] The "Hot Shot" field testing device is from Stream Systems of Concord, CA.
The Service has now listed 14 approved nontoxic shot types (see https://www.fws.gov/story/2022-04/nontoxic-shot-regulations-hunting-waterfowl-and-coots-us). In analyzing the potential effect of these shots on listed migratory birds, the Endangered Species Program concurred with the DMBM finding that no adverse effects are anticipated from such use.

3.0 STATUS OF SPECIES AND CRITICAL HABITAT

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

3.1 WHOOPING CRANE

In the mid-1800s, the whooping crane's principal breeding range extended from central Illinois north-westward through northern Iowa, western Minnesota, northeastern North Dakota, southern Manitoba and Saskatchewan, and into central Alberta. The whooping crane disappeared from its breeding range in the north-central United States by the 1890s. Historically, the whooping crane wintered along the coast of the Gulf of Mexico from Florida to central Mexico. A non-migratory breeding population existed along the coast of Louisiana until the mid-1940s. There were two important migration routes, one between Louisiana and Manitoba and the other from Texas and the Rio Grande Delta region to the Canadian provinces. (Canadian Wildlife Service [CWS] and USFWS 2007)

3.1.1 ACTION AREA

The proposed action may affect (1) the wild population of whooping cranes in or adjacent to areas open to migratory game bird hunting on the Gulf coast on or around Aransas National Wildlife Refuge (NWR), Texas, and migration and staging areas through northeastern Montana, northeastern Colorado, the western half of North Dakota, central South Dakota, Nebraska, Kansas, Oklahoma, and east-central Texas, (2) the non-migratory populations in Florida and Louisiana, and (3) the eastern migratory population that inhabits portions of 20 eastern States during their migration and wintering periods.

3.1.2 LIFE HISTORY AND DISTRIBUTION

The whooping crane stands 5 feet tall and has a long, sinuous neck and long legs. Its snowy white body feathers are accented by jet-black wingtips and a red and black head with a long, pointed beak. The whooping crane's wingspan measures about 7 feet. The whooping crane is named for its call, which has been described as a shrill, bugle-like trumpeting.

Whooping cranes feed and roost in wetlands and upland grain fields where they associate with ducks, geese, and sandhill cranes (*Grus canadensis*). Whooping cranes nest in marshy areas among bulrushes, cattails, and sedges that provide food and protection from predators. They eat insects, minnows, crabs, clams, crayfish, frogs, rodents, small birds, and berries. Whooping cranes usually nest once each year, normally laying two eggs in late April to mid-May, with hatching occurring about one month later. Typically, only one nestling survives to fledging. Both adults share incubation and rearing duties, but females take the primary role in feeding and caring for the young. Autumn migration normally begins in mid-September with individuals arriving in wintering grounds in late October and mid-November, with some later arrivals occurring in early January. Whooping cranes may live up to 30 years in the wild and 35 to 40 years in captivity.

Although widely distributed, the whooping crane was never common, although at one time it is believed there were more than 10,000 whooping cranes in North America (CWS and USFWS

2007). The total population had already been much reduced by the mid-1800s and may have been between 500 to 1,400 individuals according to one estimate (Nebraska Game and Parks Commission 2022). The whooping crane was listed as endangered on March 11, 1967 (32 FR 4001).

3.1.3 POPULATION STATUS

There are currently 702 whooping cranes in four wild populations (Table 2) and 134 captive individuals at numerous locations (International Crane Foundation 2022a). Captive breeding efforts started shortly after the species was listed, because of the risk of losing the entire wild flock of whooping cranes due to a natural disaster such as disease or hurricane, and to help increase whooping crane numbers.

Table 2. 2022 Whooping Crane Population Estimates for Each Separate Wild Population Segment

Population	Male	Female	Unknown	Total	Breeding Pairs
Aransas-Wood Buffalo	-	-	-	543	102
Eastern Migratory	35	38	3	76	-
Louisiana Non-migratory	38	29	10	77	-
Florida Non-migratory	-	-	-	6	-
Total				**702**	

Sources: Butler et al. 2022; International Crane Foundation 2022a, 2022b; Louisiana Department of Wildlife and Fisheries 2022.

3.1.4 ARANSAS-WOOD BUFFALO PARK (AWBP) POPULATION

Several free-ranging populations of whooping cranes have occurred in the U.S. The only fully wild population of whooping cranes nest in the Northwest Territories and adjacent areas of Alberta, Canada, primarily within the boundaries of Wood Buffalo National Park. Whooping cranes arrive at this breeding area in late April. The cranes winter along the central Texas Gulf of Mexico coast at Aransas NWR and adjacent areas, typically arriving between late October and mid-November. Occasionally, stragglers may not arrive until late December. All whooping cranes alive today have come from the all-time low of 15 whooping cranes wintering at Aransas NWR in 1941 (CWS and USFWS 2007). Since then, the Aransas-Wood Buffalo Park (AWBP) population has slowly increased due to conservation efforts. These have included a combination of strict legal protection, habitat preservation, and continuous international cooperation between Canada and the United States that has allowed the only remaining wild population to increase steadily to an estimated 543 birds in the winter of 2021-2022 (Butler et al. 2022).

Annual growth of the population has averaged 4.4 percent per year long-term (Butler et al. 2022). The population first surpassed 100 birds in 1987 and 200 birds in 2004. During the winter of 2021-22, 543 whooping cranes were estimated in the primary survey area (Butler et al. 2022). Examination of the 77-year trend in whooping crane numbers shows an increase with occasional, periodic declines. The population remained stable from winter 2017-2018 to winter 2019-2020 but has grown over the last two years (Butler et al. 2022).

The AWBP has been expanding numerically and geographically for some time. Each year, Canadian Wildlife Service (CWS) and Parks Canada conduct aerial surveys in the Wood Buffalo

National Park. These surveys occur at the end of May for the purpose of locating nests and then again in late July to count the number of chicks fledged. Additionally, because whooping crane nesting areas have expanded to regions outside of the park, the CWS, Calgary Zoo, and Parks Canada began a citizen science project using satellite photos to find whooping crane nesting sites. The project was trialed in 2020 and launched on a wider scale in 2021. In 2021, 102 nests were identified, including 4 new nests. Aerial surveys in August 2021 detected 50 chicks (Parks Canada 2021).

Critical habitat for this population was designated on May 15, 1978, in nine areas within their 2,400-mile migration route between northeastern Alberta and east-central Texas. Four of these critical habitat locations were subsequently removed in 1997. The remaining five areas of critical habitat are found within Kansas, Nebraska, Oklahoma, and Texas, primarily on Federal lands.

3.1.5 FLORIDA NON-MIGRATORY NON-ESSENTIAL EXPERIMENTAL POPULATION

The Service also established a non-migratory, non-essential experimental population in Florida on January 22, 1993 (58 FR 5647-5658). These birds are found in the Kissimmee Prairie area of central Florida. From 1993 to 2004, 289 isolation-reared cranes were released in this area, in an effort to establish a non-migratory flock. This flock successfully fledged its first whooping crane chick born in the wild during summer 2002. However, the reintroduction has not been successful with only six individuals remaining in 2022 (International Crane Foundation 2022a). Three adult females were translocated to the Louisiana population, with the most recent occurring in October 2021. All three individuals have paired and set up territories in Louisiana, but have yet to produce offspring (Louisiana Department of Wildlife and Fisheries 2022).

3.1.6 MIGRATORY NON-ESSENTIAL EXPERIMENTAL EASTERN POPULATION

A migratory non-essential experimental Eastern Population was designated on June 26, 2001, and encompassed the states of Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, North Carolina, Ohio, South Carolina, Tennessee, Virginia, Wisconsin, and West Virginia (66 FR 33903-33917). This population would summer and breed in central Wisconsin and winter in west-central Florida. Whooping cranes have been led behind ultralight aircraft to Chassahowitzka NWR to establish migratory behavior (Stehn 2002a). The five surviving whooping cranes from the 2001 ultralight-led fall migration arrived in Wisconsin from Chassahowitzka NWR in April 2002, following a nine-day, 1,230-mile, unassisted northern migration. This historic journey marked the first time in more than a century that whooping cranes had migrated over eastern North America (Stehn 2002b). In addition, 4 juveniles were released into the wild in central Wisconsin in the fall of 2005 and followed wild cranes south to appropriate wintering areas and migrated back north in the spring. This process is continuing and may provide an alternate methodology to reintroduce migratory whooping cranes into eastern North America. In February of 2007, eighteen juvenile whooping cranes died in storms that swept through central Florida. As of December 2022, there were an estimated 76 individuals in this migratory population (see Table 2). Eighteen of the 76 individuals are wild-hatched and the remainder are captive-reared (International Crane Foundation 2022b). Individuals from the migratory population are now making unassisted migrations to and from the wintering areas in central Florida, principally following a course through central and western Georgia, north-central Alabama, central Tennessee, western Kentucky and northward to the core breeding area of central Wisconsin. However, whooping cranes from this population may occur anywhere in the southeastern United States. In 2022, there were a total of 31 nests including 24 first nesting attempts and 7 renesting attempts

(International Crane Foundation 2022c). Fledging success has been low. As of July 2022, at least 14 chicks hatched but only five were still alive (International Crane Foundation 2022c). By December 2022, four of the five where alive; one was found dead in November 2022 of a suspected vehicle or powerline collision (International Crane Foundation 2022b). Observations suggest that the presence of biting insects may play a role in nest abandonment (Urbanek et al. 2010, Adler et al. 2018).

3.1.7 LOUISIANA NON-MIGRATORY NON-ESSENTIAL EXPERIMENTAL POPULATION

Another attempt to establish a non-migratory population has occurred in Louisiana, in an area where they historically nested until the 1940s. Whooping cranes were reintroduced in February 2011 (76 FR 6066-6082) and were designated as non-essential experimental. During 2012, fourteen cranes were released at the White Lake Wetlands Conservation Area in Vermilion Parish. To date, 153 birds have been released at the White Lake Wetlands Conservation Area. Most recently, four juvenile, male Whooping Cranes were released in November 2021. One died from predation just days after release, but the remaining three survived. Spring and summer wandering of juveniles into adjacent states has occurred. During the 2022 breeding season, 13 pairs hatched16 chicks (10 pairs hatched one chick; three pairs hatched two chicks). Eight chicks survived to fledging. Currently, the population is comprised of 77 individuals (Louisiana Department of Wildlife and Fisheries 2022).

3.1.8 MORTALITY

The current status of cranes is a result of both human and natural activities. Collisions with structures, such as power lines, have resulted in deaths or injuries. Habitat degradation and loss is considered one of the more important factors in the decline of the cranes. Conversion of lands in the U.S. Central Plains States to agriculture, draining of marshes and wetlands in the Gulf States, and encroachment of woody vegetation into portions of the Platte River channel in Nebraska have all contributed to the decline of the species (Lewis 1995). Human disturbance may also cause a reduction in productivity. Disturbances that occur in different portions of their range include boat and barge traffic, fishing, crabbing, clamming, tour boats, and aerial flights. Biological attributes of cranes that preclude a rapid recovery of the species include delayed sexual maturity, small clutch size, and low recruitment (USFWS 1994).

Historically, shooting of cranes by hunters caused losses of individuals, but this source of mortality has been much reduced as efforts to educate hunters about differences between whooping and sandhill cranes has intensified.

Population studies of ABWP indicate a 10-year survivorship cycle of unknown cause (Boyce and Miller 1985, Boyce 1987, Nedelman et al. 1987). Among 68 Whooping Cranes marked with transmitters, Pearse et al. (2019) confirmed deaths of 17 by recovering remains between 12 June 2011 and 30 March 2015 using location information provided by satellite transmitters. At death, three birds were adults, seven sub-adults, four fledged juveniles, and two pre-fledged juveniles. Mortalities occurred in all seasons and over a wide period within summer and winter. Mortality during winter accounted for 44% of annual mortality; 42% of deaths occurred during summer, and 14% during migrations. Predation and disease were known causes of mortality for Whooping Cranes in the study conducted by Pearse et al. (2019).

An incident in Kansas during the fall of 2004, involved two (and possibly three) whooping cranes shot illegally. As background, the sandhill crane season in that state had opened the first Saturday in November since its inception in 1993. From 1982–92, approximately 70 percent of

the whooping crane use-days (number of individuals times number of days reported) in Kansas were reported before November 4, the midpoint of possible dates on which the first Saturday in November occurs. Since 1993, the migration of whooping cranes has occurred slightly later, with approximately 60 percent of whooping crane use-days occurring prior to November 4 (Sharp et al. 2010).

The latest whooping crane observation in Kansas was November 12 during 1961–1981, December 6 during 1982–1992, and December 31 during 1993–2003. The number of whooping crane sightings in Kansas has increased as their total population has increased, going from 334 during the 10-year period 1984–1993, to 474 during, 1994–2003. Not surprisingly, the number of groups ($r = 0.81$, $df = 38$, $P < 0.01$) and number of individual whooping cranes ($r = 0.74$, $P < 0.01$) reported in Kansas since 1961, are significantly correlated with peak whooping crane population the previous winter. As the total number of whooping cranes increases, we should expect some lengthening of the migration period, regardless of weather, and possibly some expansion of the area where they are observed in Kansas.

Sandhill crane migration has also shifted slightly later, although peak numbers still occur during the first half of November. Based on bi-weekly waterfowl surveys at selected sites throughout Kansas during 1982–1992, numbers of sandhill cranes observed during the second half of November were almost identical to those observed during the second half of October. During 1993–2003, the number of sandhill cranes observed in Kansas during the second half of November was almost double that reported for the second half of October. Preliminary results from a 1999–2003, satellite telemetry study of sandhill cranes indicate that for Kansas mean arrival date was October 30, median departure date was November 18, and median length of stay was 20 days (Gary Krapu, USGS, unpublished data). However, these results are from only 15 cranes.

Based on the above discussion, beginning with the 2004–05 hunting season, additional protective measures were developed specifically to address the illegal shooting mortalities in Kansas. Delaying the initiation of the statewide sandhill crane hunt to the first Wednesday following the first Saturday in November was expected to reduce adverse effects because analyses indicate a higher number of use-days (74%) will have already occurred in Kansas, suggesting most whooping cranes have left the state for points farther south (Sharp et al. 2010). In addition, fewer hunters typically frequent the field during mid-week, which should also reduce exposure of whooping cranes to pressure by hunters.

These incidents reinforce the importance of hunters understanding local hunting regulations prior to hunting and ensuring that they can accurately identify targeted species. The Service, the Texas Parks & Wildlife Department, the Kansas Department of Wildlife, Parks, and Tourism, and other state agencies and partners are working together on several outreach strategies aimed at minimizing future waterfowl hunting conflicts on the wintering grounds.

Although losses due to sport hunting of migratory birds have decreased over time, losses due to shooting by vandals have increased sharply in recent years. Since 1967 34 whooping cranes have been shot, the majority taking place in the reintroduced populations (International Crane Foundation 2022d). Because of the nature of these crimes, reducing the mortality due to this cause is problematic. For birds shot either by vandals or in cases still under investigation, most (74%) have been determined to not be associated within legal hunting seasons. In the few cases that involved hunters, the hunters were already in violation of a hunting regulation, such as shooting before legal hunting hours, when poor lighting makes identification difficult. The most recent shooting occurred in Oklahoma in late 2021 when four whooping cranes were

killed, the most in any other single incident (International Crane Foundation 2022d). The Service, International Crane Foundation, State Game and Fish Agencies, and other crane organizations have increased awareness and outreach campaigns to decrease illegal shootings.

3.2 STELLER'S EIDER

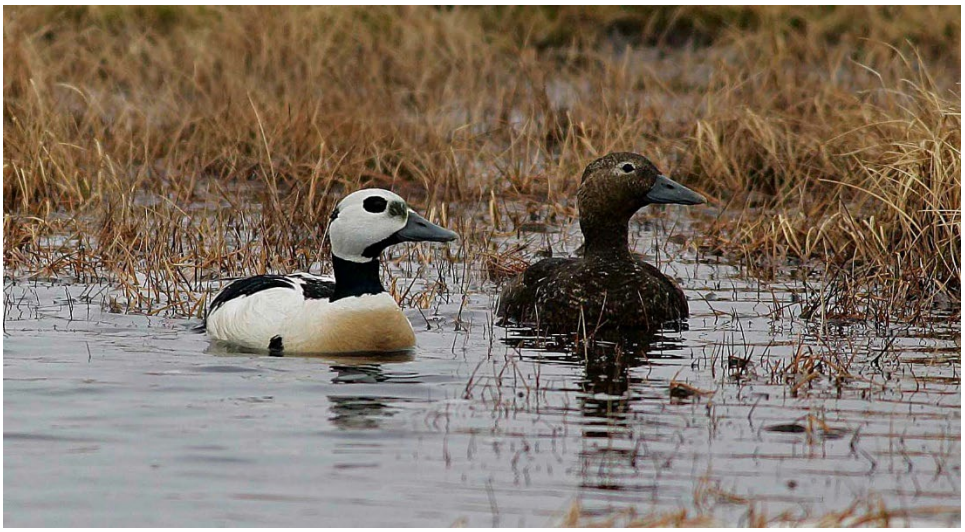
3.2.1 ACTION AREA

The proposed action may affect Steller's eider where fall and winter populations overlap with hunting activities in southwest, western, south-central, north, and northwest Alaska, the Aleutian Islands, the Alaska Peninsula, and Kodiak Island.

3.2.2 PHYSICAL APPEARANCE

The Steller's eider is a sea duck with a circumpolar distribution and the sole member of the genus *Polysticta*. The Steller's eider is the smallest of the four eider species, weighing approximately 700–800 g (1.5–1.8 lbs.). Males are in breeding plumage (Figure 1) from early winter through mid-summer. Breeding males have a large white shoulder patch contrasting with chestnut breast and belly that darkens centrally, and a black spot on each side in front of their wings. Their head is white to silver with pale green on the lores, a distinctive black spot surrounding eye, and a dark olive patch flanked by black on the nape. Their neck is black, extending in arrow shape down the back. During late summer and fall, males molt to dark brown with a white-bordered blue wing speculum. Following replacement of flight feathers in the fall, males re-acquire breeding plumage, which lasts through the next summer. Females are dark mottled brown with a white-bordered blue wing speculum year-round. Juveniles are dark mottled brown until fall of their second year, when they acquire breeding plumage.

Figure 1 Male and Female Steller's Eider in Breeding Plumage



3.2.3 STATUS AND DISTRIBUTION

Steller's eiders are divided into Atlantic and Pacific populations; the Pacific population is further divided into the Russia-breeding population, which nests along the Russian eastern arctic coastal plain, and the Alaska-breeding population. The Alaska breeding population of the Steller's eider was listed as threatened on July 11, 1997 based on:

- Substantial contraction of the species' breeding range on the ACP and Yukon-Kuskokwim Delta (Y-K Delta);
    - Steller's eiders on the North Slope historically occurred east to the Canada border (Brooks 1915) but have not been observed on the eastern North Slope in recent decades (USFWS 2002).
    - Only nine Steller's eider reproductive attempts were recorded on the Y-K Delta from 1997 through 2017 (USFWS 2019).
- Reduced numbers breeding in Alaska; and
- Resulting vulnerability of the remaining Alaska-breeding population to extirpation (USFWS 1997).

In Alaska, Steller's eiders breed almost exclusively on the ACP and molt and winter, along with the majority of the Russia-breeding population, in southcentral Alaska (Figure 2). Periodic non-breeding of the entire population of Steller's eiders breeding near Utqiaġvik (formerly Barrow), AK, the species' primary breeding grounds, coupled with low nesting and fledging success, has resulted in very low productivity (Quakenbush et al. 2004) and may make the population particularly vulnerable to extirpation.

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 historic 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.

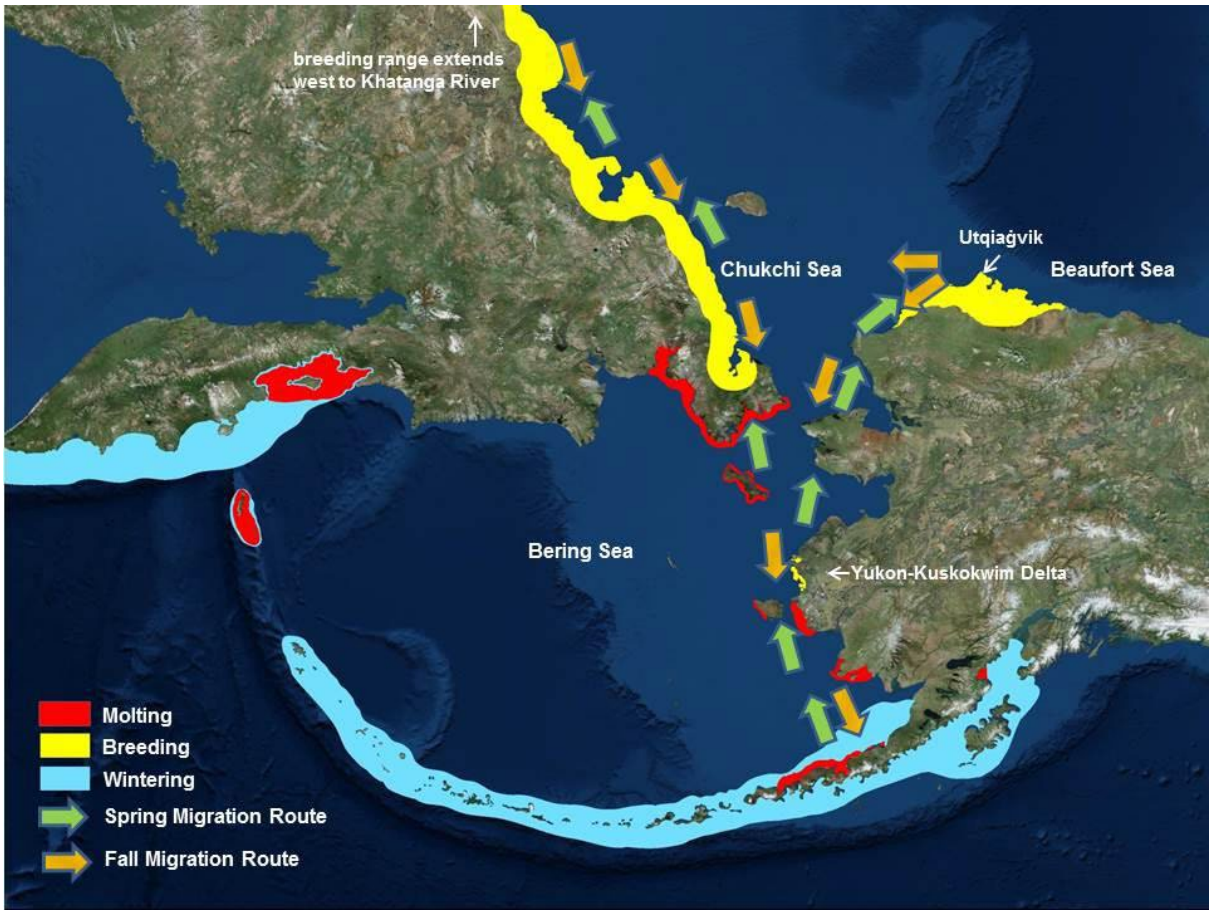
3.2.4 Life History – North Slope (Breeding)

Breeding ecology – Steller's eiders arrive in small flocks of breeding pairs on the ACP[1] in early June. Nesting on the ACP is concentrated in tundra wetlands near Utqiaġvik, AK (Figure 3) and occurs at lower densities elsewhere on the ACP from Wainwright east to the Sagavanirktok River (Quakenbush et al. 2002). Long-term studies of Steller's eider breeding ecology near Utqiaġvik indicate periodic non-breeding by the entire local breeding population. From 1991-2017, Steller's eiders nests were detected in 19 of 27 years (Graff 2018). Periodic non-breeding by Steller's eiders near Utqiaġvik seems to correspond to fluctuations in lemming populations and risk of nest predation (Quakenbush et al. 2004).

During years of peak abundance, lemmings are a primary food source for predators including jaegers, owls, and foxes (Pitelka et al. 1955, MacLean et al. 1974, Larter 1998, Quakenbush et al. 2004). It is hypothesized that Steller's eiders and other ground-nesting birds increase reproductive effort during lemming peaks because predators preferentially select (prey-switch) for hyper-abundant lemmings and nests are less likely to be depredated (Roselaar 1979, Summers 1986, Dhondt 1987, Quakenbush et al. 2004). Furthermore, during high lemming abundance, Steller's eider nest survival (the probability of at least one duckling hatching) has been reported as a function of distance from nests of jaegers and snowy owls (Quakenbush et al. 2004). These avian predators aggressively defend their nests against other predators and this defense likely indirectly imparts protection to Steller's eiders nesting nearby.

[1] Steller's eiders nest in extremely low numbers on the Y-K Delta and will not be treated further here. See the Status and Distribution section for further discussion of the Y-K Delta breeding population.

Figure 2. Steller's Eider Distribution in the Bering, Beaufort, and Chukchi Seas



Steller's eiders initiate nesting in the first half of June and nests are commonly located on the rims of polygons and troughs (Quakenbush et al. 2004). Mean clutch size at Utqiaġvik was 5.7 ± 1.18 SD (range = 4.8–6.6) from 1991–2017 (USFWS 2019). Breeding males depart following onset of incubation by the female. Average nest survival probability near Utqiaġvik was 0.31 and ranged from 0.0 to 0.88 from 1991–2017 (USFWS 2019). Nest survival is affected by predation levels, and averaged 0.19 (95% CI, 0.12-0.28) from 1991–2000 (no nest were found from 2001–2004) before fox control was implemented near Utqiaġvik and 0.40 (95% CI, 0.30-0.50) from 2005–2016 during years with fox control (Graff 2018).

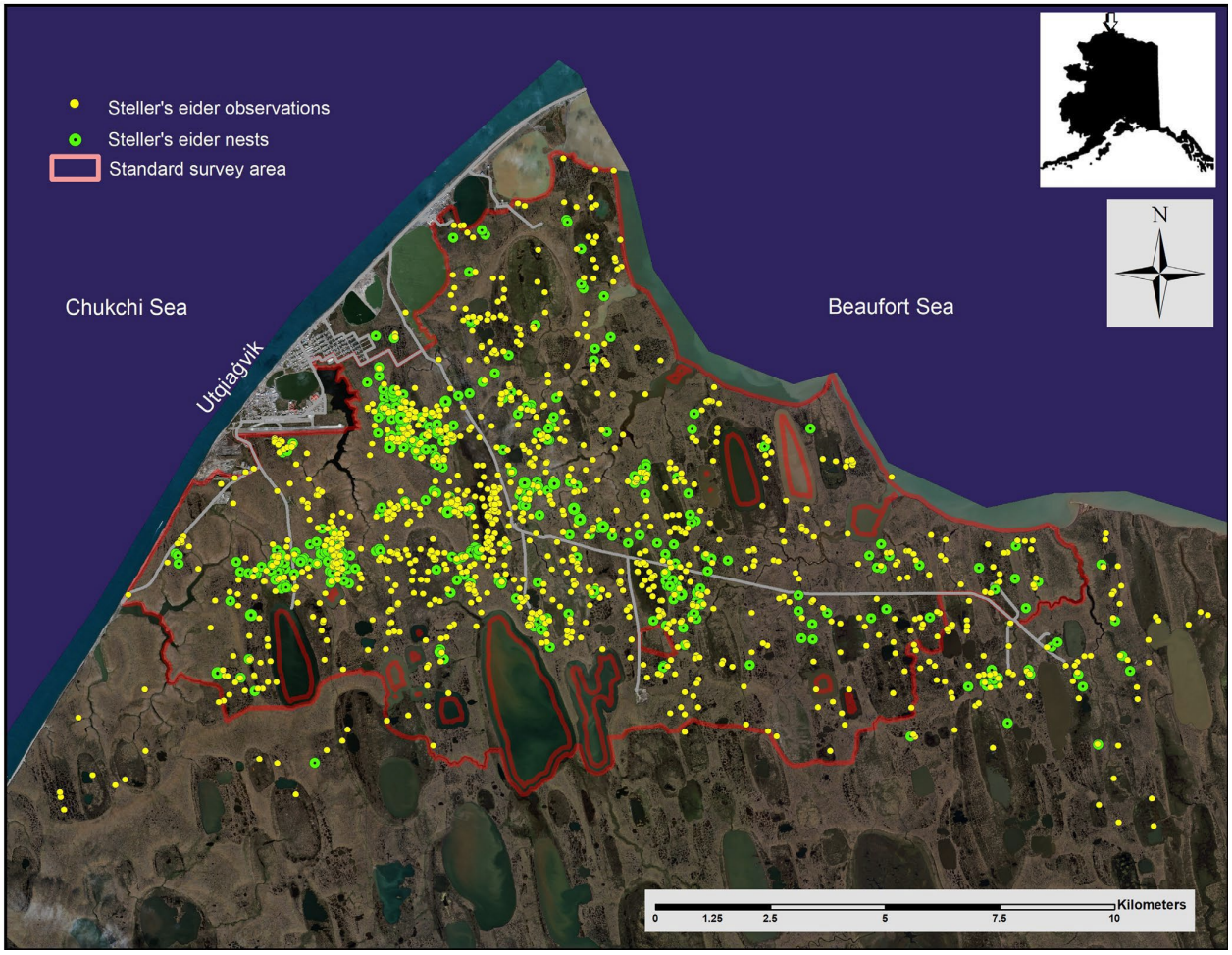
Steller's eider nest failure has been attributed to depredation by jaegers (*Stercorarius* spp.), common ravens (*Corvus corax*), arctic fox (*Alopex lagopus*), glaucous gulls (*Larus hyperboreus*), and in at least one instance, polar bears (*Ursus maritimus*) (Quakenbush et al. 1995, Rojek 2008, Safine 2011, Safine 2012).

Hatching occurs from mid-July through early August, after which hens move their broods to adjacent ponds with emergent vegetation dominated by *Carex* spp. and *Arctophila fulva* (Rojek 2006, 2007, and 2008). In these brood-rearing ponds, hens with ducklings feed on aquatic insect larvae and freshwater crustaceans. In general, broods remain within 0.7 km (0.4 mi) of their nests (Quakenbush et al. 2004); although, movements of up to 3.5 km (2.2 mi) from nests have been documented (Rojek 2006 and 2007). Large distance movements from hatch sites may be a response to drying of wetlands that would normally have been used for brood-rearing

(Rojek 2006). Fledging occurs 32–37 days post hatch (Obritschkewitsch et al. 2001, Quakenbush et al. 2004, Rojek 2006 and 2007).

Information on breeding site fidelity of Steller's eiders is limited. However, research at Utqiaġvik has documented some cases of site fidelity in nesting Steller's eiders. From 1995–2016, 19 banded birds that nested near Utqiaġvik were recaptured in subsequent years again nesting near Utqiaġvik. Time between capture events ranged from 1 to 10 years and distance between nests ranged from 0.1 (0.06 mi) to 10 km (6.2 mi) (Saffine et al. 2020).

Figure 3. Steller's Eider Nest Locations (1991–2018; green) and Breeding Pair Observations (1999–2018; yellow). The Red Border Represents the Standard Annual Survey Area. This Survey is Expanded Beyond the Standard Area in Some Years.



3.2.5 LIFE HISTORY – NON-BREEDING

3.2.5.1 Localized post-breeding movements

Timing of departure from the breeding grounds near Utqiaġvik differs between sexes and between breeding and non-breeding years. In breeding years, male Steller's eiders typically leave the breeding grounds in late June to early July after females begin incubating

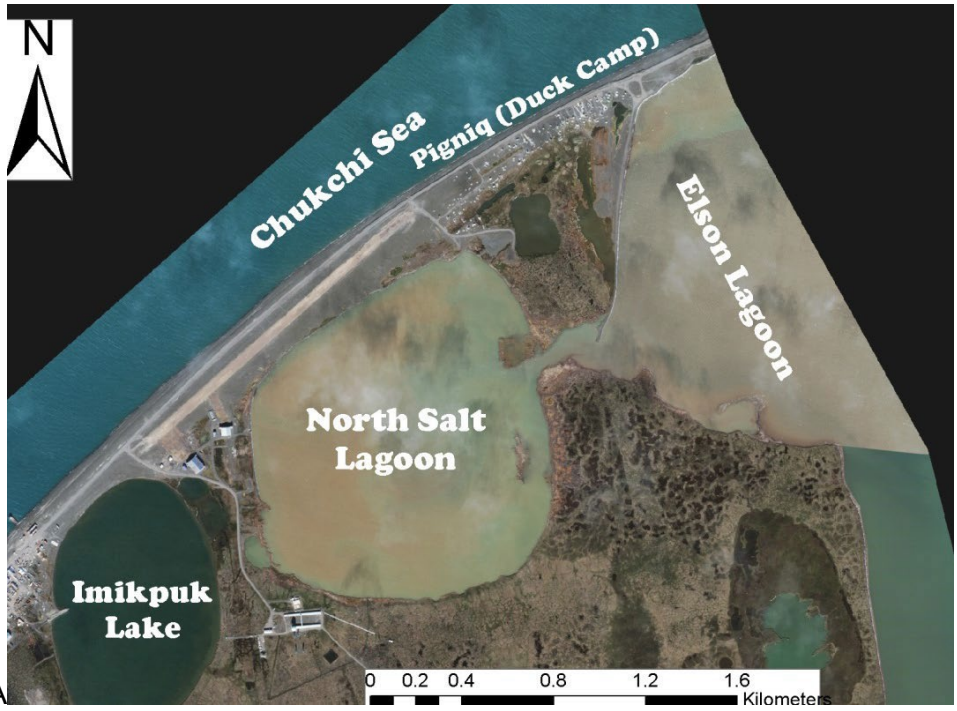
(Obritschkewitsch et al. 2001, Quakenbush et al. 1995, Rojek 2006 and 2007). Females with fledged broods depart the breeding grounds in late August and mid-September to rest and forage in freshwater and marine habitat near the Barrow spit prior to fall migration along the Chukchi coast. Females with broods are often observed 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 staging daily in Elson Lagoon, North Salt Lagoon, Imikpuk Lake, and the Chukchi Sea from late August to mid-September (USFWS, unpublished data).

Before fall migration in breeding and non-breeding years, some Steller's eiders rest and forage in coastal waters near Utqiaġvik including Elson Lagoon, North Salt Lagoon, Imikpuk Lake, and the vicinity of Pigniq (Duck Camp; Figure 4A). In breeding years, these flocks are primarily composed of males that remain in the area until the second week of July, while in non-breeding years, flocks are composed of both sexes and depart earlier than in nesting years (J. Bacon, North Slope Borough Department of Wildlife Management [NSBDWM], pers. comm.).

Safine (2012) investigated post-hatch movements of 10 Steller's eider hens with VHF transmitters in 2011. Most (8 of 10) females successfully reared broods to fledging. From late August through early September, females and fledged juveniles were observed in nearshore waters of the Chukchi and Beaufort seas from Point Barrow south along the coast approximately 18 km (11.2 mi). During this period, marked Steller's eiders and broods frequented areas traditionally used for subsistence waterfowl hunting (e.g., Duck Camp; Figure 4B; 5). There is both a spatial and temporal overlap between Steller's eiders and subsistence hunters during the post-fledging period.

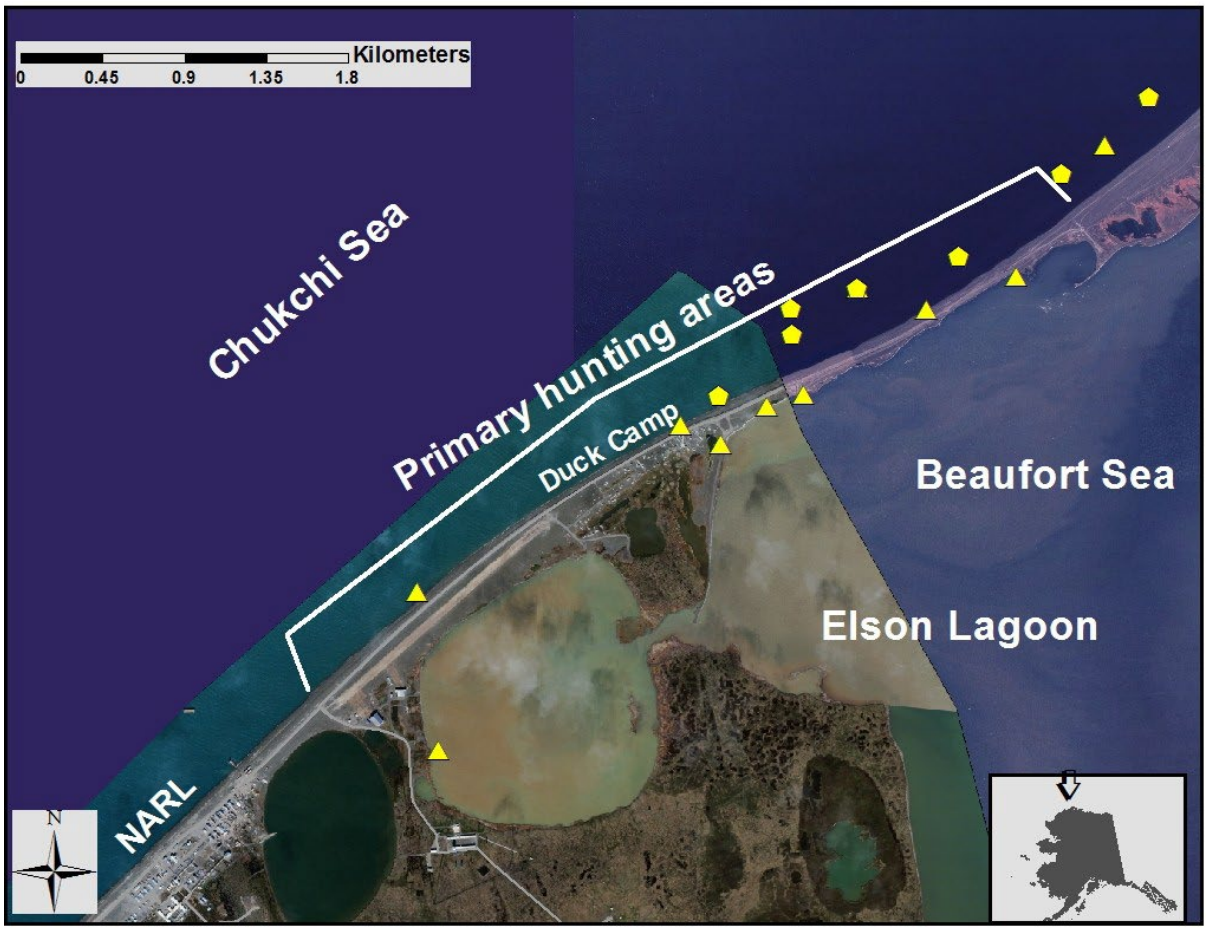
Figure 4. (A) Location of Steller's Eider Post-Breeding Staging Areas in Relation to Pignig (Duck Camp) hunting area north of Utqiaġvik, Alaska. (B) VHF Marked Steller's Eider Hen with Brood of Fledglings Resting in Elson Lagoon in Close Proximity to Duck Camp.

A



B

Figure 5. Marine Locations of Successful (triangles) and Failed (pentagons) Adult Steller's Eiders (and Juveniles) in the Immediate Vicinity of Areas Commonly Used for Subsistence Hunting Near Barrow, Alaska from Mid-August to Early September 2011.



3.2.5.2 Wing molt

Following departure from the breeding grounds, Steller's eiders migrate to molting areas in the nearshore waters of southwest Alaska where they undergo a complete flightless molt for about 3 weeks. Preferred molting areas are shallow with extensive eelgrass (*Zostera marina*) beds and intertidal mud and sand flats where Steller's eiders forage on bivalve mollusks and amphipods (Petersen 1980, 1981; Metzner 1993).

The Russia- and Alaska-breeding populations both molt in southwest Alaska, and banding studies found at least some individuals had a high degree of molting site fidelity in subsequent years (Flint et al. 2000). Primary molting areas include the north side of the Alaska Peninsula (Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands; Gill et al. 1981, Petersen 1981, Metzner 1993) as well as the Kuskoskwim Shoals in northern Kuskokwim Bay (Martin et al. 2015). Larned (2005) also reported > 2,000 eiders molting in lower Cook Inlet near the Douglas River Delta, and smaller numbers of molting Steller's have been reported around islands in the Bering Sea, along the coast of Bristol Bay, and in smaller lagoons along the Alaska Peninsula (e.g., Dick and Dick 1971; Petersen and Sigman 1977; Wilk et al. 1986; Dau 1987; Petersen et al. 1991).

3.2.5.3 Wintering Distribution

After molt, many of the Pacific-wintering Steller's eiders disperse throughout the Aleutian Islands, the Alaskan Peninsula, and the western Gulf of Alaska including Kodiak Island and lower Cook Inlet (Figure 6; Larned 2000a Martin et al. 2015), although thousands may remain in lagoons used for molting unless freezing conditions force them to move (USFWS 2002). The Service estimates that the Alaska-breeding population comprises only ~ 1%[2] of the Pacific-wintering population of Steller's eiders. Wintering Steller's eiders usually occur in shallow waters (< 10 m deep), which are generally within 400 m of shore or at offshore shallows (USFWS 2002). However, Martin et al. (2015) reported substantial use of habitats > 10 m deep during mid-winter. Use of these habitats by wintering Steller's eiders may be associated with night-time resting periods or with shifts in the availability of local food resources (Martin et al. 2015).

3.2.5.4 Spring Migration

Early in spring migration, thousands of Steller's eiders stage in estuaries along the north side of the Alaska Peninsula or lower Cook Inlet (Rosenberg et al. 2014), including some molting lagoons, and at Kuskokwim Shoals near the mouth of the Kuskokwim River in late May (Figure 6; Larned 2007, Martin et al. 2015). Larned (1998) concluded that Steller's eiders show strong site fidelity to preferred habitats[3] during migration, where they congregate in large numbers to feed before continuing northward migration.

Spring migration usually includes movements along the coast, although some Steller's eiders

[2] See further discussion under Population Dynamics subsection.

[3] 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 1998, Larned 2000a, Larned 2000b, Larned et al. 1993).

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). Like other eiders, Steller's eider probably use spring leads for feeding and resting as they move northward, but there is little information on habitat use after departing spring staging areas.

3.2.5.5 Migration Patterns Relative to Breeding Origin

There is limited information available on the migratory movements of Steller's eiders, particularly in relation to their breeding origin, and it remains unclear where the Russia and Alaska breeding populations merge and diverge during molt and spring migrations, respectively. The best available information is from the Martin et al. (2015; Figure 6) satellite telemetry study discussed previously and a second telemetry study by Rosenberg et al. (2011). Martin et al. (2015) marked 14 birds near Utqiaġvik, Alaska (within the range of the listed Alaska-breeding population) in 2000 and 2001. Although samples sizes were small, results suggested disproportionately high use of Kuskokwim Shoals by Alaska-breeding Steller's eiders during wing molt compared to the Pacific population as a whole. However, Martin et al. (2015) did not find Alaska-breeding Steller's eiders to preferentially use specific wintering areas. The second study marked Steller's eiders wintering on Kodiak Island, Alaska and followed birds through the subsequent spring (n = 24) and fall molt (n = 16) migrations from 2004–2006 (Rosenberg et al. 2011). Most of the birds marked on Kodiak migrated to eastern arctic Russia prior to the nesting period and none were relocated on land or in nearshore waters north of the Yukon River Delta in Alaska (Rosenberg et al. 2011).

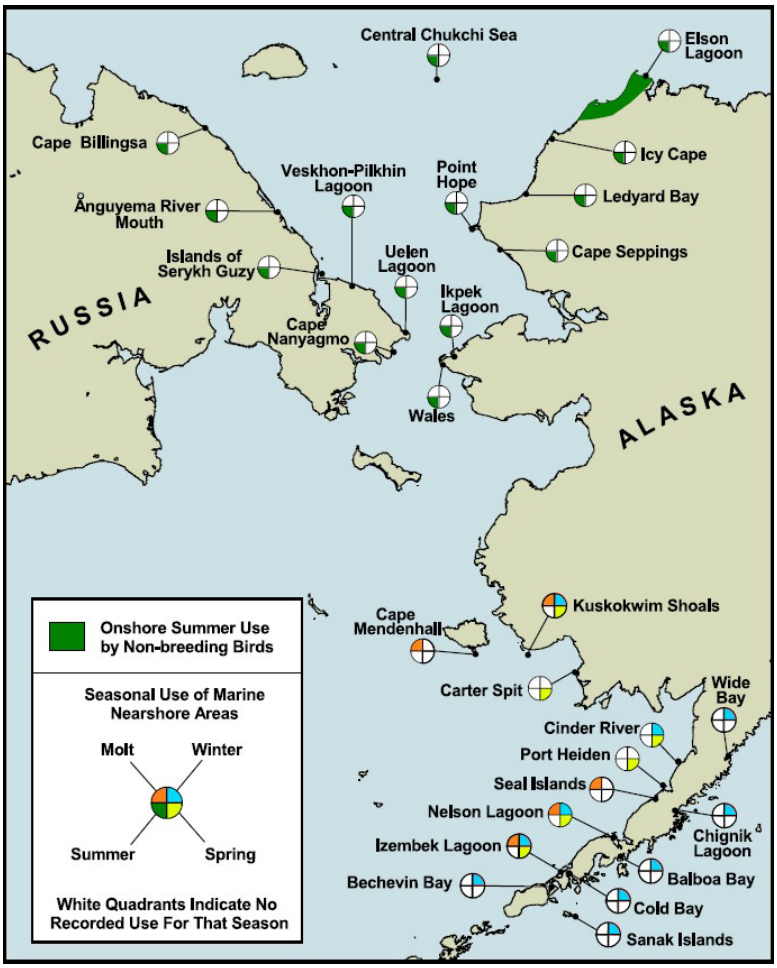
3.2.6 POPULATION DYNAMICS

3.2.6.1 Pacific population: Spring Population Estimates and Trends

The majority of the world's 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 aerial surveys were flown in late spring from 1992–2012 to monitor the population status and habitat use of Steller's eiders staging in southwest Alaska prior to spring migration (USFWS 2019). Annual abundance estimates ranged from 54,888 (2010) to 137,904 (1992) with a mean of 81,453 birds (Larned 2012). The long-term trend (1992–2012) indicates an annual decline of 2.4 percent per year (R^2=0.45; Larned 2012). Larned (2012) suggests 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 single annual counts in later surveys.

The estimated annual abundance of Steller's eiders present on the ACP from 2007–2017 of 308 birds (95% CI: 216-422; USFWS 2019) is approximately 0.4% of the average estimate of Pacific-wintering Steller's eiders from 1992–2012 (81,453; Larned 2012). Thus, the listed Alaska-breeding population is thought to represent only a small proportion of the Pacific-wintering population of Steller's eiders.

Figure 6. Distribution of Alaska-breeding Steller's Eiders During the Non-Breeding Season, Based on the Location of 13 Birds Implanted with Satellite Transmitters in Utqiaġvik, Alaska, June 2000 and June 2001.



3.2.6.2 Alaska-breeding population: abundance and trends on the Arctic Coastal Plain

Stehn and Platte (2009) evaluated Steller's eider population and trends obtained from three aerial surveys on the ACP:

- USFWS Arctic Coastal Plain (ACP) survey
  - 1989–2006 (Mallek et al. 2007)
  - 2007–2008 (new ACP survey design; Larned et al. 2008, 2009)
- USFWS North Slope eider (NSE) survey
  - 1992–2006 (Larned et al. 2009)
  - 2007–2008 (NSE strata of new ACP survey; Larned et al. 2008, 2009)
- Utqiaġvik Triangle (ABR) survey, 1999–2007 (ABR, Inc.; Obrishkewitsch et al. 2008)

In 2007, the ACP and NSE surveys were combined under a new ACP survey design. Surveys differed in spatial extent, seasonal timing, sampling intensity, and duration. Consequently, they produced different estimates of Steller's eider population sizes and trends. These estimates, including results from previous analyses of the ACP and NSE survey data (Mallek et al. 2007, Larned et al. 2009), are summarized in Table 3. Most observations of Steller's eider from both

surveys occurred within the boundaries of the NSE survey (Figure 7). The ACP survey encompasses the entire area shown (61,645 km^2); the NSE Survey includes only the northern portion outlined in green (30,465 km^2). (Modified from Stehn and Platte 2009).

Figure 7. All Sightings from the ACP Survey (1989–2008) and the North Slope Eider Survey (1992–2006).

Following assessment of potential biases inherent in the two USFWS surveys, Stehn and Platte (2009) identified a subset of the NSE survey data (1993–2008) that they determined was "least confounded by changes in survey timing and observers." Based on this subset of the NSE survey, the average population index[4] for Steller's eiders was 173 (90% CI 88–258) with an estimated population growth rate of 1.011 (90% CI 0.857–1.193). The average population size of Steller's eiders breeding in the ACP was estimated at 576 (292–859, 90% CI; Stehn and Platte 2009) assuming a detection probability of 30%[5]. Currently, this analysis provides the best available estimate of the Alaska-breeding Steller's eider population size and growth rate from the ACP. Note that these estimates are based on relatively few observations of Steller's eiders each year with none seen in many survey years.

The Utqiaġvik Triangle (ABR) survey, conducted annually by ABR, Inc., provides more intensive coverage (50%, 1999–2004; 25–50%, 2005–2010) of the northernmost portion of the ACP. Based on ABR survey data, Stehn and Platte (2009) estimated the average population index for Steller's eiders residing within the Utqiaġvik Triangle was 99.6 (90% CI 55.5–143.7) with an estimated population growth rate of 0.934 (90% CI 0.686–1.272). If we also assume the same 30% detection probability applied to the NSE estimate described in the previous section, the average population size of Steller's eiders breeding in the Utqiaġvik Triangle survey area would be 332 (185–479, 90% CI).

[4] Geographically extrapolated total indicated Steller's eiders derived from NSE survey counts.
[5] Detection probability of 30% (visibility correction factor = 3.33) selected based on evaluation of estimates for similar species and habitats (Stehn and Platte 2009).

3.2.6.3 Breeding Population Near Utqiaġvik, Alaska

The tundra surrounding Utqiaġvik supports the only significant concentration of Steller's eiders nesting in North America. Utqiaġvik is the northernmost community on the ACP and standardized ground surveys for eiders have been conducted near Utqiaġvik since 1999 (Figure 8; Rojek 2008). Surveys were not conducted in 2020 or 2021 due to the SARS-CoV-2 (COVID-19) Pandemic. Counts of males are the most reliable indicator of Steller's eider presence because females are cryptic and they often go undetected in counts. The greatest concentrations of Steller's eiders observed during Utqiaġvik ground surveys occurred in 2013 and 2014 with 192 and 137 males, respectively (Table 3; Graff 2021). Mean nest survival rate for Steller's eiders (1991–2019) was 0.30 (SE 0.05). Low nest survival occurred in 1997, 2013, 2017, 2018 when very few nests were found and no known nests hatched (nest survival = 0). In contrast, nest survival was highest in 2006 when an average number of nests were found (n=16) and most nests hatched (nest survival = 0.88; 95% CI = 0.67–1.00; Graff 2021).

Figure 8. Map depicting the Utqiaġvik Ground survey area (small gray triangle), Utqiaġvik Triangle survey area (pink) and the Arctic Coastal Plain (ACP) survey area (yellow) in Alaska.

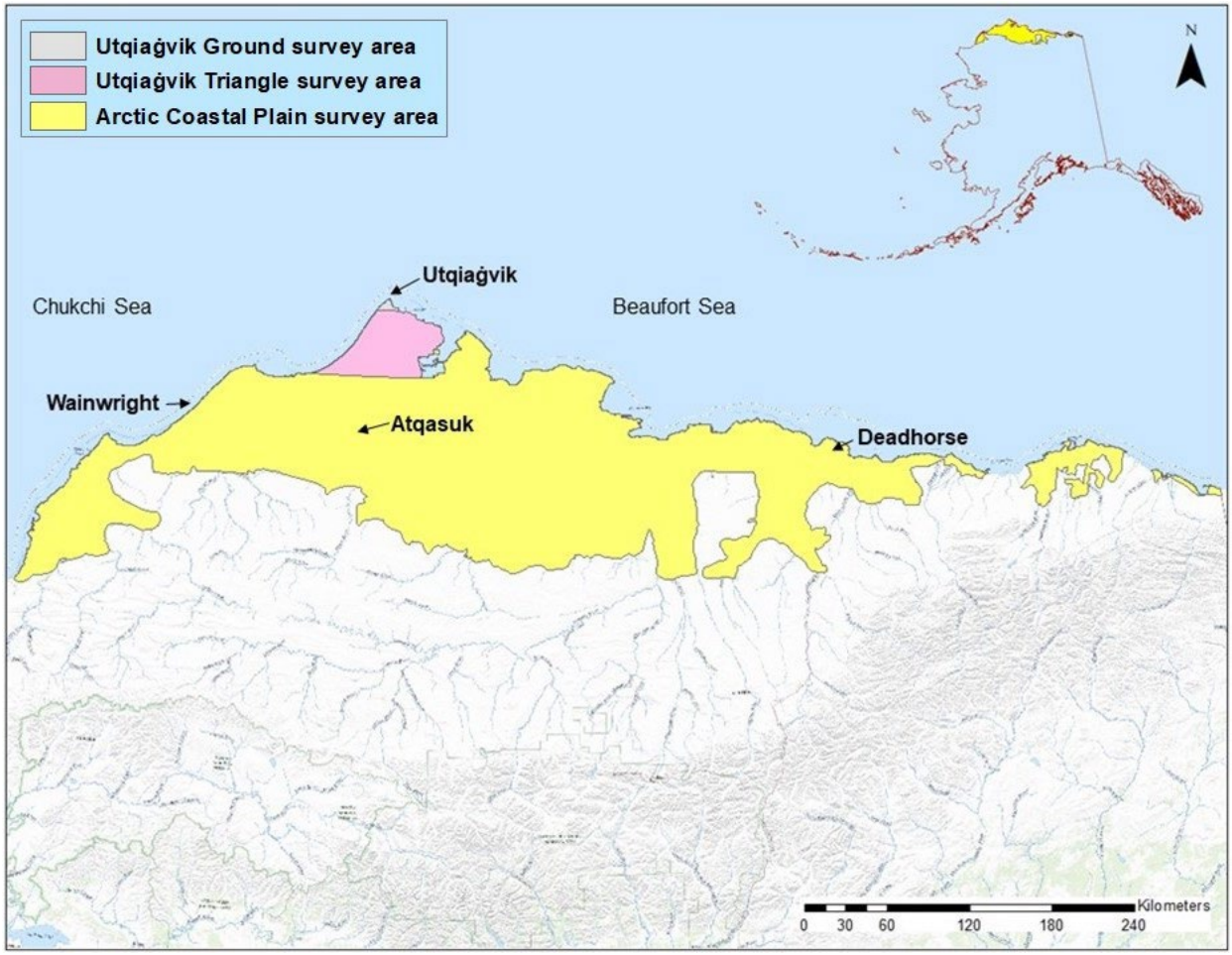


Table 3. Steller's eider males, nests, and pair densities recorded during ground-based and aerial surveys conducted near Utqiaġvik, Alaska 1999-2022.[a]

Year	Overall Ground-based Survey Area for Each Year			Standard Ground-based Survey Area[b]		Aerial Survey of Utqiaġvik Triangle		Nests Found Near Utqiaġvik
	Area (km^2)	Males counted	Pair Density (males/km^2)	Males counted	Pair Density (males/km^2)	Males counted	Pair Density (males/km^2)[c]	
1999	172	135	0.78	132	0.98	56	0.04	36
2000	136	58	0.43	58	0.43	55	0.04	23
2001	178	22	0.12	22	0.16	22	0.02	0
2002	192	1	<0.01	0	0	2	<0.01	0
2003	192	10	0.05	9	0.07	4	<0.01	0
2004	192	10	0.05	9	0.07	6	<0.01	0
2005	192	91	0.47	84	0.62	31	0.02	21
2006	191	61	0.32	54	0.40	24	0.02	16
2007	136	12	0.09	12	0.09	12	0.02	12
2008	166	114	0.69	105	0.78	24	0.02	28
2009	170	6	0.04	6	0.04	0	0	0
2010	176	18	0.10	17	0.13	4	0.01	2
2011	180	69	0.38	59	0.44	10	0.01	27
2012	176	61	0.35	55	0.41	37	0.03	19
2013	180	192	1.07	93	0.69	27	0.04	4
2014	170	137	0.81	119	0.89	30	0.05	50
2015	175	96	0.55	87	0.65	7	0.01	13
2016	175	29	0.17	26	0.19	3	<0.01	12
2017	175	38	0.22	35	0.26	12	0.02	4
2018	170	87	0.51	78	0.58	14	0.01	13
2019	175	53	0.30	53	0.40	30	0.02	25
2022	175	53	0.30	51	0.38	n/a	n/a	6

Sources: Graff 2021, Graff pers. com. 2022

n/a = not available

[a] Surveys were not conducted in 2020 or 2021 due to SARS-CoV-2 (COVID-19) Pandemic.

[b] Standard area (the area covered in all years) was 134 km^2 (2008-2019) and ~134.5 km^2 in previous years.

[c] Actual area covered by aerial survey (50% coverage) was ~1,408 km^2 in 1999 and ~1,363 km^2 in 2000-2006, 2008, 2017-2019). Coverage was 25% in 2007, 2010, 2011, and 2013 – 2016 (~682 km^2) and 27% in 2009 (~736 km^2) and 40% in 2012 (~1,114 km^2). Pair density calculations are half the bird density calculations reported in ABR, Inc.'s annual reports (e.g., Obritschkewitsch and Gall 2020).

3.2.7 STATUS AND DISTRIBUTION

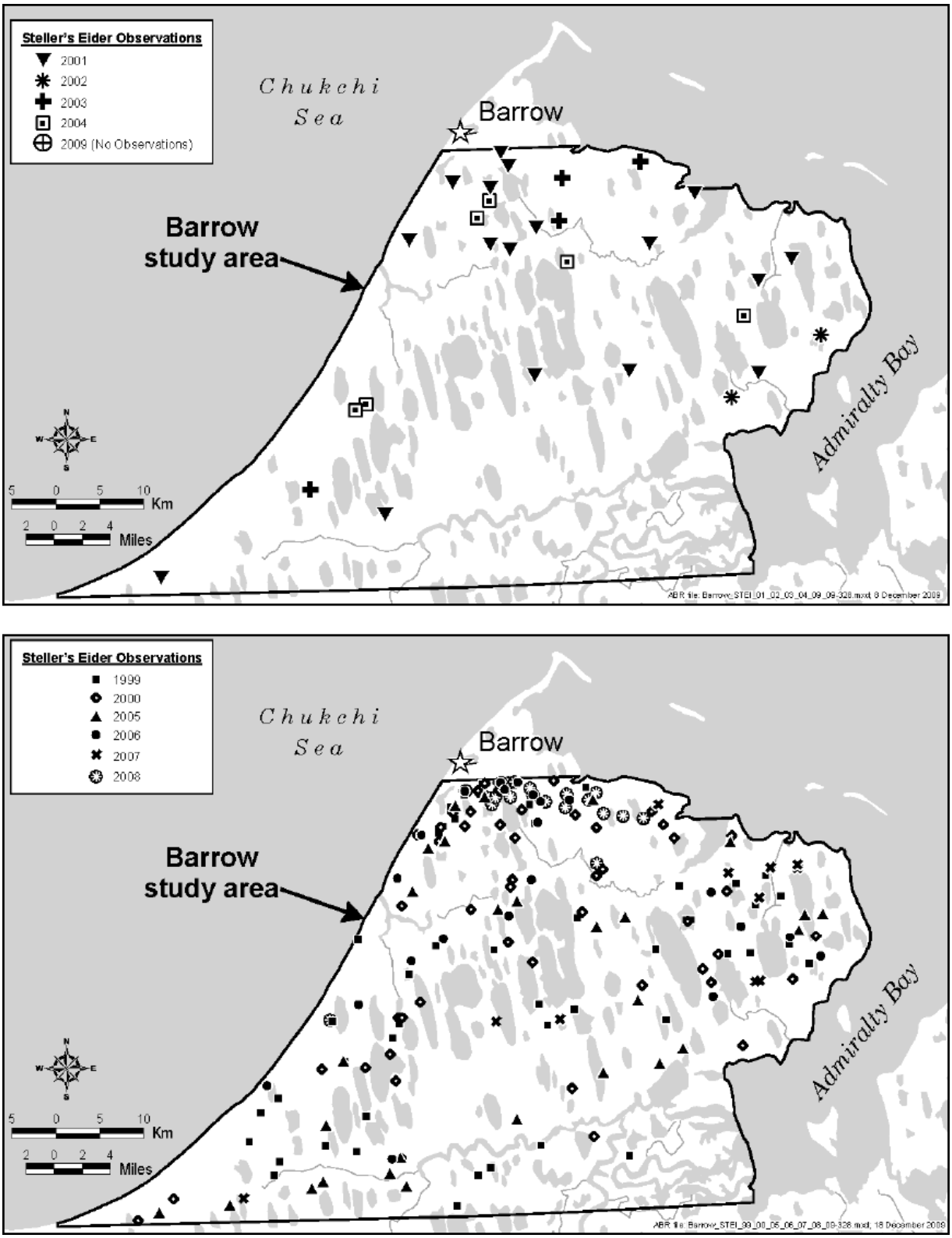
On June 11, 1997, the Alaska-breeding population of Steller's eiders was listed as threatened based on a substantial decrease in this population's breeding range and the increased vulnerability of the remaining Alaska-breeding population to extirpation (USFWS 1997). Although population size estimates for the Alaska-breeding population were imprecise, it was clear Steller's eiders had essentially disappeared as a breeding species from the Y-K Delta, where they had historically occurred in significant numbers, and that their ACP (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 ACP (Figure 9), particularly near Utqiaġvik and at very low densities from Wainwright to at least as far east as Prudhoe Bay. A few pairs may still nest on the Y-K Delta; only nine Steller's eider reproductive attempts were recorded on the Y-K Delta from 1997 through 2017 (USFWS 2019).

3.2.8 RECOVERY CRITERIA

A recovery plan for Steller's eider was first published in 2002 (USFWS 2002). A revised recovery plan was released in 2021. The Service completed a Species Status Assessment (SSA) in 2019 that synthesized the available information on the listed population of Steller's eider and assessed the population's current and future viability. The results of the SSA served as the background for the development of the revised recovery plan.

The revised recovery plan presents two alternatives for recovery and delisting of Steller's eider. The first alternative is based on the current distribution of Steller's eiders and presents recovery criteria for the Pacific-wintering population, which includes both Alaska-breeding and Pacific Russia-breeding Steller's eiders; the Utqiaġvik Ground survey area; the Utqiaġvik Triangle survey area, and the ACP survey area excluding the Utqiaġvik Triangle survey area.

Figure 9. Locations of Steller's Eiders During Utqiaġvik Triangle Aerial Surveys in Non-nesting Years (top) and Nesting Years (bottom), June 1999–2009 (Obritschkewitsch and Ritchie 2011)



Because of uncertainty in the historical distribution and population abundance in other areas in Alaska, it is possible that Steller's eiders could colonize other areas, for example as a result of habitat changes that make other areas suitable for nesting. Therefore, the second alternative includes recovery criteria that allows for documented occurrence outside of, and in addition to, the areas included under the first alternative. Table 4 presents the recovery criteria under each alternative.

Table 4. Recovery criteria for Alaska-breeding Steller's eiders. The first column describes the basic concepts that the Steller's Eider Recovery Team considered necessary for delisting. The second column describes the specific metrics and thresholds required to meet the conceptual recovery criteria. Steller's eider numbers presented indicate total individuals. (USFWS 2021b)

ALTERNATIVE 1	
Concept	**Criterion**
We are 80% confident that the Pacific-wintering population is stable or increasing in abundance;	If the lower 80% confidence limit of the estimated trend in abundance of the Pacific-wintering population is ≥ 1.0, using at least 5 years of data, but not exceeding 15 consecutive years;
THEN	THEN
The number of Steller's eiders present annually in the Utqiaġvik Ground survey area (north of the Utqiaġvik Triangle survey area) must be similar to, or higher than, numbers observed over the last three decades; AND We must be 80% confident that the number of Steller's eiders present annually in the Utqiaġvik Triangle survey area during the breeding season is similar to, or higher than, numbers observed over the last three decades, over a reasonably long time-frame; AND We must be 80% confident that the number of Steller's eiders present annually in the ACP (but outside of Utqiaġvik Triangle survey area) during the breeding season is similar to, or higher than, numbers observed over the last two decades, over a reasonably long time-frame;	Using data from the most recent 20 years, the mean number of Steller's eiders observed in the Utqiaġvik Ground survey area must be ≥ 50; AND Using data from the most recent 20 years, the lower 80% confidence limit of the estimated mean number of Steller's eiders present in the Utqiaġvik Triangle survey area during the breeding season must be ≥ 200; AND Using data from the most recent 20 years, the lower 80% confidence limit of the estimated mean number of Steller's eiders present in the ACP, but outside the Utqiaġvik Triangle survey area, during the breeding season must be ≥ 100;
OR	OR
If the distribution of breeding Steller's eiders in Alaska shifts to outside of the ACP, then we must be 80% confident that the estimated number of Steller's eiders in Alaska is at least the same as the number required if the population is solely present in northern Alaska.	Using data from the most recent 20 years, the lower 80% confidence limit of the estimated mean number of Steller's eiders present in breeding habitat in Alaska must be ≥ 350, with a wide enough distribution to ensure adequate redundancy and representation[1].
ALTERNATIVE 2	
Concept	**Criterion**

If the size of the Pacific-wintering population is unknown, or we are not 80% confident that the Pacific-wintering population is stable or increasing in abundance;	If the size of the Pacific-wintering population is unknown, or if the lower 80% confidence limit of the estimated trend in abundance of the Pacific-wintering population is ≤ 1.0, using surveys over the last 5 years but not exceeding 15 consecutive years;
THEN	THEN
The number of Steller's eiders present annually in the Utqiaġvik Ground survey area (north of the Utqiaġvik Triangle survey area survey area) must be higher than that in Alternative One; AND We must be 95% confident that the estimate of the number of Steller's eiders present annually in the Utqiaġvik Triangle survey area during the breeding season is 50% higher than that in Alternative One; AND We must be 95% confident that the estimate of the number of Steller's eiders present annually in the ACP (but outside of the Utqiaġvik Triangle survey area) during the breeding season is 50% higher than that in Alternative One;	Using data from the most recent 20 years, the mean number of Steller's eiders observed in the Utqiaġvik Ground survey area must be ≥ 75; AND Using data from the most recent 20 years, the lower 95% confidence limit of the estimated mean number of Steller's eiders present in the Utqiaġvik Triangle survey area during the breeding season must be ≥ 300; AND Using data from the most recent 20 years, the lower 95% confidence limit of the estimated mean number of Steller's eiders present in the ACP, but outside the Utqiaġvik Triangle survey area, during the breeding season must be ≥ 150;
OR	OR
If the distribution of breeding Steller's eiders in Alaska shifts to outside of the ACP, the estimated number of Steller's eiders in Alaska, and our confidence in the estimate, we must be 95% confident that the population is 50% larger than that required in Alternative One. The distribution must be wide enough to ensure adequate redundancy and representation.	Over the most recent 20 years, the lower 95% confidence limit of the estimated mean number of Steller's eiders present in breeding habitat in Alaska must be ≥ 525, with a wide enough distribution to ensure adequate redundancy and representation[1].
THREATS-BASED CRITERIA	
Threats, including (but not limited to) ingestion of lead ammunition, mortality from shooting, bird collisions with structures, human disturbance in the breeding area, nest predation, and changes to the ecological community, must be found to not affect the ability of the population to meet and maintain the demographic criteria above.	
[1] We currently have little data from which to determine an appropriately-sized distribution outside of northern Alaska, so we intentionally refrained from identifying a specific sized area as a criterion. Instead, the Service decision-makers will need to rely on the best available scientific information at the time of review to make this determination.	

3.2.9 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.

3.3 SPECTACLED EIDER

3.3.1 ACTION AREA

The proposed action may affect spectacled eiders where fall and winter populations overlap with hunting activities in western, north, and northwest Alaska, Ledyard Bay, Norton Sound, and the Bering Sea west, south, and southwest of Lawrence Island.

3.3.2 PHYSICAL APPEARANCE

Spectacled eiders are medium-sized sea ducks, averaging about 1,500 g (3.3 lbs.) in weight and 50 cm (9.7 inches) in total length. Males in breeding plumage have a white back, black breast, and pale green head with large white, black-rimmed "spectacles" around the eyes (Figure 10). In late summer and autumn adult 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 females are mottled brown and males mottled brown and white. Both males and females have sloped foreheads and bills (USFWS 2021c).

Figure 8. Male and Female Spectacled Eiders in Breeding Plumage.

3.3.3 STATUS AND DISTRIBUTION

The spectacled eider occurs in northern latitudes along coastal Alaska and easternmost Russia, as well as in the Bering Sea. Spectacled eiders were listed as threatened throughout their range on May 10, 1993 (58 FR 27474) based on indications of steep declines in the two Alaska-breeding populations. There are three primary spectacled eider populations, each corresponding to breeding grounds on Alaska's North Slope, the Y-K Delta, and northern

Russia. The Y-K 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, AK (R. Suydam, pers. comm. in USFWS 1996) suggested concurrent localized declines on the North Slope, although data for the entire North Slope breeding population were not available.

Spectacled eiders molt in several discrete areas (Figure 11) during late summer and fall, with birds from the different populations and genders apparently favoring different molting areas (Petersen et al. 1999). All three spectacled eider populations overwinter in openings in pack ice of the central Bering Sea, south and southwest of St. Lawrence Island (Petersen et al. 1999; Figure 11), where they remain until March–April (Lovvorn et al. 2003).

Critical habitat for spectacled eiders was designated on February 6, 2001, to protect molting areas in Norton Sound and Ledyard Bay, nesting areas on the Y-K Delta, and the wintering area south of St. Lawrence Island (66 FR 9146).

Figure 9. 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.

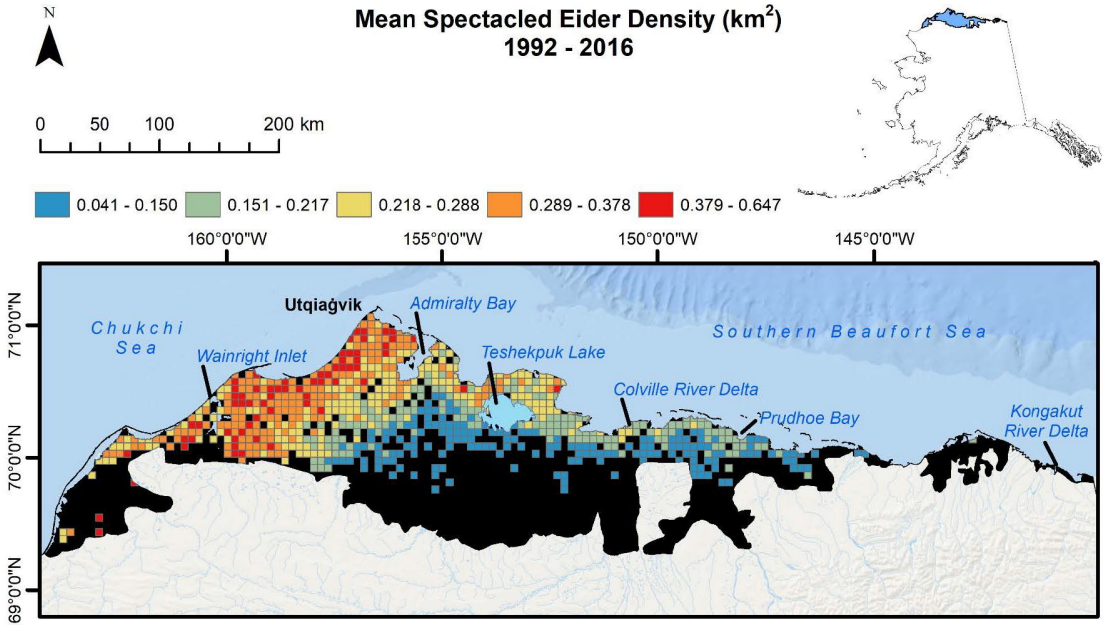
3.3.4 LIFE HISTORY

3.3.4.1 Breeding

In Alaska, spectacled eiders breed primarily on ACP and the Y-K Delta. On the ACP, spectacled eiders breed from approximately Pt. Lay to the Canning River (USFWS 2021c). Breeding density varies across the ACP (Figure 12). Although spectacled eiders historically occurred throughout the coastal zone of the Y-K Delta, they currently breed primarily in the central coast zone within about 15 km (~9 miles) of the coast from Kigigak Island north to Kokechik Bay (USFWS 2021c). However, sightings on the Y-K 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 average clutch size near Utqiaġvik has ranged from 3.6 to 5.1 (Safine 2011, 2012, 2013, 2015; Graff 2016, 2018, 2020). 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).

Figure 10. Spectacled Eider Density (km^2) Across the Arctic Coastal Plain, Alaska, 1992-2016. Black Represents Areas with No Observations. (Amundson et al. 2019).



Nest initiation on Kigigak Island on the Y-K 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 Y-K Delta compared to the ACP. Mean annual clutch size ranged from 3.8–5.4 in coastal areas of the Y-K Delta (1985–2011; Fischer et al. 2011), and 4.0–5.5 on Kigigak Island (1992–2015; Gabrielson and Spragens 2013, Moore and Sowl 2017), with clutches of up to eight eggs reported (Lake 2007).

On the breeding grounds, spectacled eiders feed on mollusks, insect larvae, 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 to 55 days after hatch, and females with broods move from freshwater to marine habitats just prior to or after fledging (Safine 2011).

Survivorship

Nest success is highly variable and thought to be influenced by predators, including gulls (*Larus* spp.), jaegers (*Stercorarius* spp.), and red (*Vulpes vulpes*) and arctic (*Alopex lagopus*) foxes. In arctic Russia, apparent nest success was calculated as <2% in 1994 and 27% in 1995 at Indigirka; low nest success was attributed to predation (Pearce et al. 1998). At Chaun, nest success ranged from 0.0 to 0.5 from 2003–2016 and declined over that period (Solovyeva and Solovyev 2013b, Solovyeva and Kokhanova 2017, Solovyeva et al. 2018). Solovyeva et al. (2018) attributed the decline to increases in the large gull (Vega [*Larus argentatus vegae*] and glaucous gull [*Larus hyperboreus*]) and mammalian predator populations, which depredate spectacled eider eggs, and a concurrent decrease in Sabine's gull (*Xema sabini*) and Arctic tern (*Sterna paradisaea*) populations that provide some predator protection.

Available data suggest that nest success is lower on the ACP than on the Y-K Delta. Nest survival probability at Utqiaġvik ranged from 0.19 – 0.72 from 2009–2019 (Safine 2011, 2012, 2013, 2015, Graff 2016, 2018, 2020). East of Utqiaġvik, mean apparent nest success (number of nests survived/number of nests found) in the Kuparuk oil fields was 0.42 from 1993–2007 (range 0.13 to 0.92; Anderson et al. 2007) and 0.31 from 1994–1999 on the Colville Delta (range 0.11 to 1.0; Bart and Earnst 2005).

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) or when foxes were eliminated from the island prior to the nesting season. Bowman et al. (2002) also reported high variation in nesting success (20–95%) of spectacled eiders on the Y-K Delta, depending on the year and location. Nest success estimates from Kigigak in more recent years (2003–2015) also varied annually, ranging from 0.05 in 2015 to 0.91 in 2007 (Gabrielson and Spragens 2013, Moore and Sowl 2017).

In addition to egg loss due to predation or abandonment, eggs can be inviable due to infertility, or from embryonic death due to factors such as inadequate incubation conditions, disease, or contaminant exposure. Spectacled eider nesting studies used different metrics to describe egg viability, making it difficult to compare between study sites. From 1969–1973 at the Onumtuk study site, northeast of Kashunuk, only 0.7 percent of spectacled eider eggs were addled or infertile (Dau 1974). In contrast, at Kashunuk (1992–2004) and Kigigak (1992–2015), the percentage of spectacled eider nests that contained at least one inviable egg varied from 11 percent to 30 percent among years (Grand and Flint 1997, Moore and Sowl 2017). The average number of inviable eggs in nests that contained any inviable eggs was two. Overall, 7.7 percent of eggs discovered were inviable at these study sites. At Utqiaġvik, no inviable eggs were found in half of the years from 2010–2019. In the years when inviable eggs were detected, between 6 percent and 20 percent of spectacled eider nests had at least one inviable egg (Safine 2012, 2013, 2015, Graff 2016, 2018, 2020). In Arctic Russia, Pearce et al. (1998b) found only one inviable egg in 1994 and 1995 at Indigirka. At Chaun, 1.5 – 4.1 percent of spectacled eider eggs per year were inviable from 2003–2015 (Kokhanova and Solovyeva 2015). Typical nest monitoring methods include candling or floating only a subset of the clutch to estimate incubation stage, which results in some inviable eggs going undetected, particularly in those

nests that are later depredated. Variation in field techniques and characteristics of study sites may have influenced detection of eggs. Therefore, the number of inviable eggs reported are likely underestimates of the true rate. In summary, relatively high rates of egg inviability were observed on Y-K Delta study areas in some years; however, spectacled eider egg viability appears to vary over time and among nesting areas.

Recruitment rate (the percentage of young eiders that hatch, fledge, and survive to sexual-maturity) of spectacled eiders is poorly known because there is limited data on juvenile survival. Duckling survival, defined as the proportion of hatched young that survive until 30 days after hatch, has been shown to vary annually (Flint et al. 2006). Flint et al. (2006) also found that duckling growth and site-specific survival rates were correlated, suggesting that habitat conditions influence both growth and survival. In a coastal region of the Y-K Delta, Flint et al. (2016) estimated duckling survival of 0.39 at Kashunuk River using data collected from 1993–2002, and 0.67 at Kigigak Island from two years of data (1999–2000). Survival of adult females during the first 30 days post hatch was 93% (Flint and Grand 1997).

3.3.4.2 Fall Migration and Molting

As with many other sea ducks, spectacled eiders spend the 8- to 10-month non-breeding season at sea, but until recently much about the species' life in the marine environment was unknown. Satellite telemetry and aerial surveys led to the discovery of spectacled eider migrating, molting, and wintering areas. These studies are summarized in Petersen et al. (1995), Larned et al. (1995), and Petersen at al. (1999). Results of recent satellite telemetry research (2008–2011) are consistent with earlier studies (Matt Sexson, USGS, pers. comm.). Spring migration and breeding, including arrival, nest initiation, hatch, and fledging, is 3–4 weeks earlier at Y-K Delta (second week of May) compared to the ACP (first week of June); however, phenology of fall migration is similar between areas. Individuals depart breeding areas July–September, depending on their breeding status and molt in September–October (Matt Sexson, USGS, pers. comm.).

Males generally depart breeding areas on the ACP when the females begin incubation in late June (Anderson and Cooper 1994, Bart and Earnst 2005). Use of the Beaufort Sea by departing males is variable. Some appear to move directly to the Chukchi Sea over land, while the majority moved rapidly (average travel of 1.75 days), over near shore waters from breeding grounds to the Chukchi Sea (TERA 2002). Of 14 males implanted with satellite transmitters, only four spent an extended period of time (11–30 days), in the Beaufort Sea (TERA 2002). Preferred areas for males appeared to be near large river Deltas such as the Colville River where open water is more prevalent in early summer when much of the Beaufort Sea is still frozen. Most adult males marked in northern and western Alaska in a recent satellite telemetry study migrated to northern Russia to molt (USGS, unpublished data). Results from this study also suggest that male eiders are likely to follow coast lines but also migrate straight across the northern Bering and Chukchi seas in route to northern Russia (Matt Sexson, USGS, unpublished data.).

Females generally depart the breeding grounds later, when much more of the Beaufort Sea is ice-free, allowing for more extensive use of the area. Females spent an average of two weeks in the Beaufort Sea (range 6-30 days) with the western Beaufort Sea the most heavily used (TERA 2002). Females also appeared to migrate through the Beaufort Sea an average of 10 km further offshore than the males (Petersen et al. 1999). The greater use of the Beaufort Sea and offshore areas by females was attributed to the greater availability of open water when females depart the area (Petersen et al. 1999, TERA 2002). Recent telemetry data indicates that molt migration of failed/non-breeding females from the Colville River Delta through the Beaufort Sea

is relatively rapid, 2–3 weeks, compared to 2–3 months spent in the Chukchi Sea (Matt Sexson, USGS, unpublished data.).

Spectacled eiders use specific molting areas from July to late October/early November. Larned et al. (1995) and Petersen et al. (1999) discussed spectacled eiders' apparently strong preference for specific molting locations and concluded that all spectacled eiders molt in four discrete areas (Table 5). Females generally used molting areas nearest their breeding grounds. All marked females from the Y-K 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

Table 5. 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
Y-K Delta Males	Mechigmenskiy Bay
	Northeastern Norton Sound
Y-K Delta Females	Northeastern Norton Sound

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.

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).

3.3.4.3 Wintering

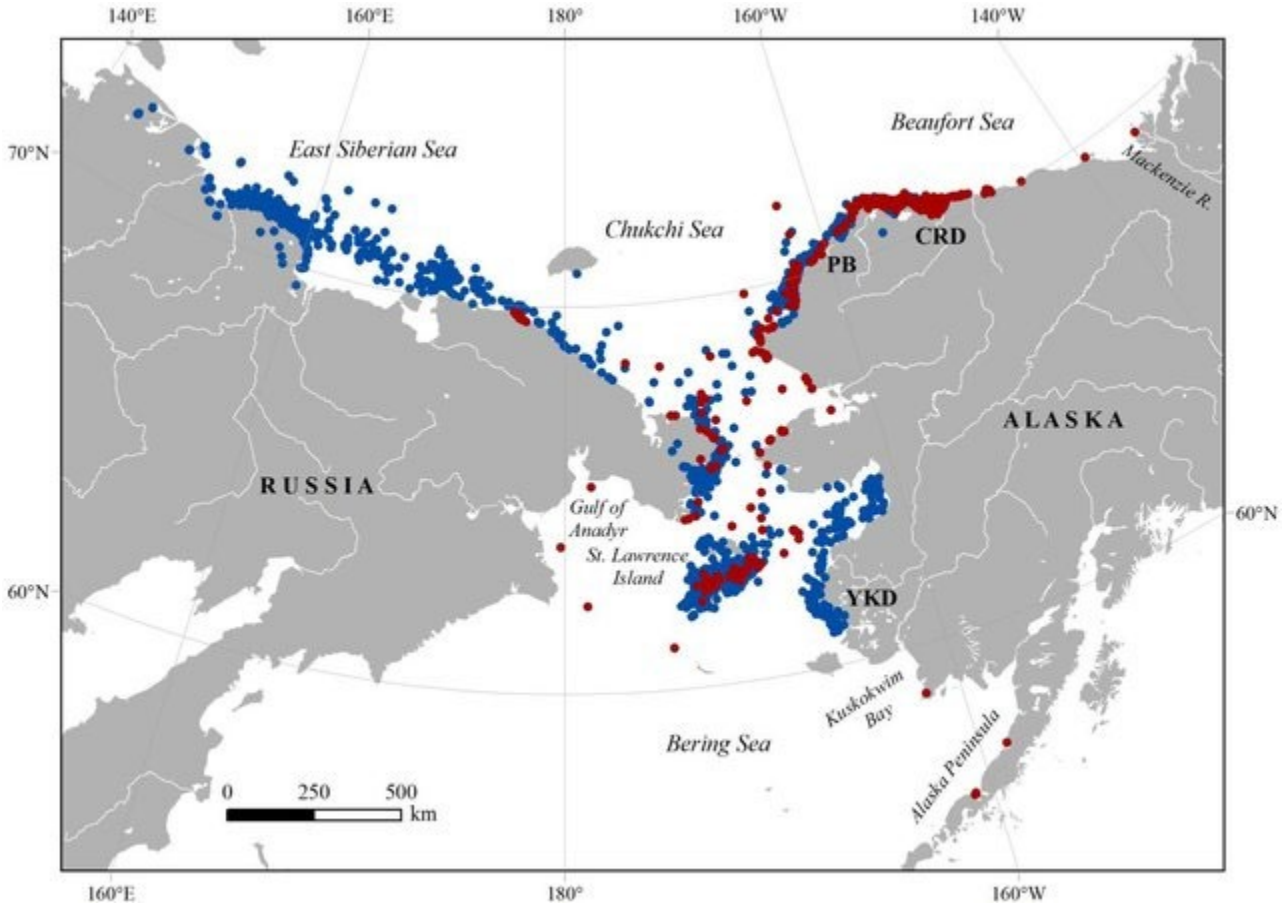
Spectacled eiders generally depart all molting sites in late October to early November (Matt Sexson, USGS, pers. comm.), migrating offshore in the Chukchi and Bering Seas to a single

wintering area in openings in pack ice of the central Bering Sea south/southwest of St. Lawrence Island (Figure 11). This area is characterized by high microbenthic community biomass (Grebmeier et al. 2015) and persistent openings in the sea ice (polynyas) (Grebmeier and Cooper 1995) that provide foraging habitat for spectacled eiders.

3.3.4.4 Spring Migration

Recent information about spectacled and other eiders indicates they probably make extensive use of the eastern Chukchi spring lead system between departure from the wintering area in March and April and arrival on the North Slope in mid-May or early June. Limited spring aerial observations in the eastern Chukchi have documented dozens to several hundred common eiders (*Somateria mollissima*) and spectacled eiders in spring leads and several miles offshore in relatively small openings in rotting sea ice (W. Larned, USFWS; J. Lovvorn, University of Wyoming, pers. comm.). Woodby and Divoky (1982) documented large numbers of king eiders (*Somateria spectabilis*) and common eiders using the eastern Chukchi lead system, advancing in pulses during days of favorable following winds, and concluded that an open lead is probably requisite for the spring eider passage in this region. Preliminary results from an ongoing satellite telemetry study conducted by the USGS Alaska Science Center (Figure 13; Sexson et al. 2014) suggest that spectacled eiders also use the lead system during spring migration.

Figure 11. Satellite Telemetry Locations Received from 89 Adult (blue points, n = 6,813) and 27 Juvenile (red points, n = 371) Spectacled Eiders Between 30 May 2008 and 9 August 2012. (Sexson et al. 2014)



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

3.3.5 ABUNDANCE AND TRENDS

Aerial surveys over the spectacled eiders' wintering area in the Bering Sea have been conducted to estimate the size of the global population. In 2020, 76,952 spectacled eiders were counted (USFWS 2021c). This was 78% lower than the next most recent count from 2010. However, the surveyors suggest that the entire population was not captured in the 2020 survey due to notable differences in the flock location, flock size, sea ice dynamics, and sample size of marked birds (USFWS 2021c). The 2010 rangewide estimate of abundance of spectacled eiders was 369,122 (364,190–374,054 90% CI) (Larned et al. 2012). Comparison of point estimates between 1997 and 2010 indicate an average of 353,051 spectacled eiders (344,147–361,956 90% CI) in the global population over that 14-year period (Larned et al. 2012).

Sexson et al. (2014) implanted satellite transmitters in spectacled eiders in the Y-K Delta in 2008, at Peard Bay in 2009, and in the Colville River Delta in 2009–2011. 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 Y-K Delta. If the same methods are applied to the 2003–2012 ACP aerial index, the resulting adjusted population estimate for North Slope-breeding spectacled eiders is 14,814 (90% CI = 13,501–16,128; Stehn et al. 2013).

The Y-K Delta spectacled eider population was thought to be about 4% of historic levels in 1992 (Stehn et al. 1993). Evidence of the dramatic decline in spectacled eider nesting on the 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 47,700–70,000 pairs of spectacled eiders nested on the Y-K Delta in average to good years (Dau and Kistchinski 1977).

Fischer and Stehn (2013) 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 Y-K Delta in 2012 and to evaluate long-term trends in the Y-K Delta breeding population from 1985–2012. 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 and Stehn 2013). The total number of spectacled eider nests on the Y-K Delta in 2012 was estimated at 8,062 (SE = 1,110). The average population growth rate based on these surveys was 1.058 (90% CI = 1.005–1.113) in 2003– 2012 and 0.999 (90% CI = 0.986–1.012) in 1985–2012 (Fischer and Stehn 2013). Log-linear regression based solely on the long-term Y-K 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).

More recently, two analyses characterized abundance and growth rate of the Y-K Delta and ACP spectacled eider breeding populations using best available data but different methods (USFWS 2021c). The first analysis used a Bayesian state-space model to estimate the abundance and growth rate using count data from 2007–2019. The second analysis used an integrated population model (IPM) linked to a population viability analysis (PVA) using survey data from 1988–2019. Results of the analyses are provided in Table 6.

Table 6. Spectacled Eider Breeding Populations Based on an Integrated Population Model and Bayesian State-space Model

Population	Analysis	Abundance (95% CRI)	Population Growth Rate (2007–2019) (95% CRI)
Y-K Delta	IPM-PVA	14,027 (9,781–18,257)	0.006 (-0.025–0.030)
	Bayesian state space model	16,113 (12,313–21,352)	0.016 (-0.065-0.091)
ACP	IPM-PVA	5,408 (3,696–7,364)	-0.025 (-0.055–0.004)
	Bayesian state space model	6,401 (3,766–9,750)	-0.005 (-0.092–0.082)

Source: USFWS 2021c.

3.3.6 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. 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) minimum estimated population size is greater than or equal to 10,000 breeding pairs over 3 or more years, or 3) the minimum estimate of abundance exceeds 25,000 breeding pairs in any survey.

4.0 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 WHOOPING CRANES

4.1.1 STATUS OF THE SPECIES IN THE ACTION AREA

The only wild population of whooping cranes nests in the Wood Buffalo National Park, Northwest Territories, Canada and winters in and around Aransas NWR, Texas. The population is increasing steadily to an estimated 543 birds in the winter of 2021-2022. In 2021, aerial surveys and review of satellite photos identified 102 nests. Annual growth of the population has averaged 4.4 percent per year long-term. The population remained stable from winter 2017-2018 to winter 2019-2020, but has grown over the last two years.

Aransas NWR allows hunting of white-tailed deer and feral hogs, but contains a provision that management may immediately close the entire refuge or any portion thereof to hunting, in the event of the appearance of whooping cranes in the hunt area [50 CFR 32.63]. Waterfowl, white-tailed deer, and feral hog hunting are permitted on Matagorda Island NWR and on private lands, both being locations where whooping cranes occur throughout the winter. Closing of these lands due to the presence of whooping cranes has not been considered.

The remaining whooping crane populations are designated as non-essential experimental populations pursuant to section 10(j) of the Act. Section 10(j) states that "each member of an experimental population shall be treated as a threatened species" and further states that any experimental population considered to be non-essential to the continued existence of a species shall be treated as a species proposed to be listed, "except when it occurs in an area within the National Wildlife Refuge System or the National Park System", where it would be considered threatened for the purposes of section 7. See Chapter III and Table 2 for total numbers of birds.

With the exception of individuals that may stray from the population of whooping cranes wintering in and around Aransas NWR in Texas, cranes found in Region 4 consist of individuals from the Eastern Migratory, Florida, and Louisiana non-essential experimental populations. Due to section 10(j) regulations, whooping cranes from non-essential experimental populations are afforded more protection (or more protection must be extended) where they occur on national parks and national wildlife refuges.

Migratory game bird hunting seasons have a considerable amount of overlap with periods of fall migration. Fall migration for the migratory whooping cranes starts in mid-September and may continue until early December with stragglers arriving on wintering areas as late as early January. Following restrictions on season length, species hunted, bag limits, etc., Federal migratory game bird frameworks typically permit hunting between September 1 and mid-February. Migratory routes followed by whooping cranes occur in and adjacent to areas where waterfowl and other migratory game bird hunting activity are allowed. The non-migratory Louisiana whooping cranes also occur in and adjacent to areas where waterfowl and migratory

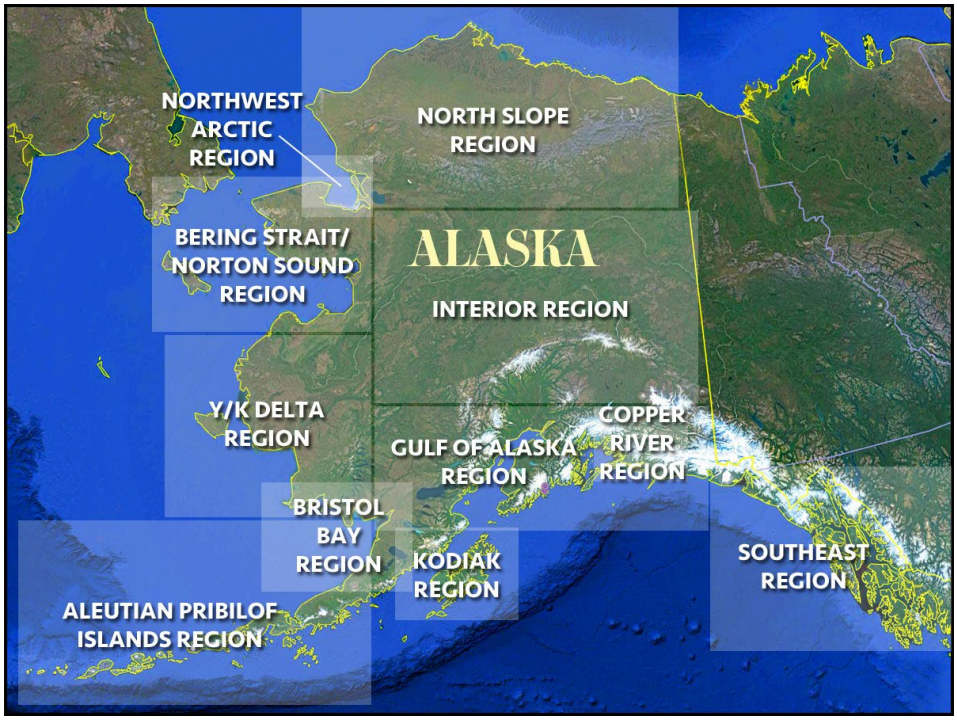
bird hunting activities take place. Specific actions and contingency plans are in place in areas to provide additional protections for whooping cranes during hunting seasons.

4.2 STELLER'S AND SPECTACLED EIDERS

4.2.1 STATUS IN THE ACTION AREA

The North Slope breeding population of spectacled eiders, approximately 5,408–6,401 (95% CRI = 3,696–9,750; USFWS 2021c), and Steller's eiders, approximately 308 birds (95% CI: 216–422; USFWS 2019) 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 most of their annual life cycle within terrestrial and marine environments of the Action Area. During the proposed Action (1 September–10 March of each year), spectacled and Steller's eiders may migrate from breeding to molting areas, occupy molting areas, migrate from molting to wintering areas, and occupy wintering areas. Spectacled eiders occur in the following Alaska Migratory Bird Co-Management Council (AMBCC) regions during the proposed Action: North Slope, Northwest Arctic, Bering Strait/Norton Sound, and Y-K Delta (Figure 14). Steller's eiders have a wider distribution during the proposed Action and can occur in the same AMBCC regions as spectacled eiders as well as the Aleutian/Pribilof Islands, Bristol Bay, Kodiak, and Gulf of Alaska regions.

Figure 12. Alaska Migratory Bird Co-Management Council (AMBCC) Regions.



Recent estimates of the North Slope-breeding population of spectacled eiders range from approximately 5,408–6,401 individuals (95% CRI = 3,696–9,750; USFWS 2021c). The highest densities of spectacled eiders observed on the North Slope during aerial surveys are consistently found near Utqiaġvik, the area near Peard Bay, southeast of Wainwright, and northeast of Teshekpuk Lake (See Figure 12).

As discussed above, it is difficult to determine the number of Steller's eiders breeding on the

North Slope. However, annual aerial eider surveys show Steller's eiders are not evenly distributed across the ACP, with the highest densities occurring near Utqiaġvik, north of 70°50' N latitude 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. Even this is likely to underestimate the actual 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 high-density nesting area is excluded because the area near the Utqiaġvik airport cannot be surveyed due to aviation safety concerns.

Both listed eider species have undergone significant, unexplained declines in their Alaska-breeding populations. Factors which may have contributed to the current status of listed eiders in the Action Area include, but are not limited to, subsistence hunting; long-term habitat loss through development and disturbance; environmental contaminants; increased predator populations; harvest; collisions with structures; research; and climate change. These impacts are occurring throughout much of the species' range, including within the Action Area.

4.2.2 SUBSISTENCE HUNTING

Waterfowl hunting in Alaska is defined by the Service as two separate hunting periods, governed by different regulations in April – August and in September – February. This BO exclusively pertains to the fall sport hunt in Alaska. It is important to note that in assessing the effects of the fall hunt, we also included the effects of the past and present subsistence harvest in both the legal subsistence hunting season (April–August as promulgated annually) and fall season as an environmental baseline condition. The April–August Subsistence hunt is considered in a separate BO developed by the Service's Alaska Regional Office (USFWS 2021a. Several methodological reasons make it difficult to divide the available harvest survey data separately into these two distinct categories. First, survey methods have changed over time; in early surveys, eider harvest was not separated by time period. Second, harvest surveys are generally (but not always) conducted after the end of the fall hunt, when hunters are asked to recall the number of birds shot before August 31, and the number shot afterward. As most subsistence hunters probably do not see the August 31 date as particularly noteworthy and significant time has passed between the early spring hunt and the day the survey takes place, it is reasonable to assume that assigning harvest accurately to two different time periods would be difficult. This is a more conservative approach that will allow us to ensure we are considering the total effect of the subsistence harvest. Further, we reason that precise allocation of impacts to the correct hunting-related increment is essential only in the event that our final conclusion were to jeopardize the continued existence of ESA listed and candidate species. If our final conclusion, after summing all identified increments of impact, is non-jeopardy, it follows that each subset of this total (i.e., both the spring/summer subsistence and fall hunts) is also non-jeopardy.

The vulnerability of Steller's and spectacled eiders to subsistence harvest varies according to location, year, and time of year. There are multiple ways in which subsistence hunting may affect listed eiders by way of: being shot; loss of eggs/chicks through disturbance or direct take; and lead contamination.

4.2.2.1 Steller's Eider Subsistence Harvest Take (USFWS 2021a)

The Service concludes Alaska-breeding Steller's eiders may be shot during the subsistence hunt: 1) during northward, spring migration; 2) while on their breeding grounds on the North Slope, especially near Utqiaġvik; 3) during post-breeding movements and migration; and 4) to a

much lesser extent, throughout their traditional molting and wintering range (Refer to Status of Species Section for life history patterns). Steller's eiders appear to be at particular risk near Utqiaġvik during the spring, summer, and fall because of their concentrated use of the Utqiaġvik area, use of habitats near the road system at Utqiaġvik, and repeated flights near Utqiaġvik Duck Camp.

To summarize previous years' Subsistence Harvest BOs, the Service has concluded that we cannot reliably characterize previous Steller's eider harvest levels in Alaska (e.g., see USFWS 2021a). Our ability to assess impacts is further compromised by difficulty in appropriately allocating harvest in some portions of Alaska to listed and unlisted populations. It is possible that no Steller's eiders are harvested in non-breeding years because of their short tenure in breeding areas and resulting lack of availability to subsistence hunters. However, the Service expected that in a breeding year, some Steller's eiders could be taken (possibly in the order of tens) by subsistence hunters, particularly on the North Slope where the majority of the listed taxon breeds, but the conservation measures below reduce that risk.

Conservation Measures to Reduce Risk of Steller Eider Subsistence Harvest (USFWS 2021a)

In response to indications that Steller's eiders have been shot in recent years, particularly 2008, the Service has developed and implemented a species-specific conservation program intended to reduce the risk. This program currently focuses on the North Slope, especially the community of Utqiaġvik. This is where the greatest risk to Steller's eiders exists, based on their relatively high nesting density and previous observations of shooting mortality. This program consists of 3 major components:

1) Regulations for the subsistence hunt, which include the authority to check hunters and verify compliance with prohibitions against closed species (including spectacled and Steller's eiders), and the expressed capability for the Service's Alaska Regional Director to prescribe emergency closure regulations in the event substantial harvest of Steller's eiders is indicated.

2) The potential presence of Service Office of Law Enforcement (OLE) agents during the subsistence harvest on the North Slope, commensurate with need, aimed at (a) enforcing regulations, (b) engaging in outreach and education efforts with hunters, and (c) verifying compliance with prohibitions against taking Steller's eiders to ensure a timely and appropriate response in the event that mortality of Steller's eiders takes place.

3) A long-term outreach and education effort, developed and implemented collaboratively with hunters and residents of the North Slope, to seek support for Steller's eider conservation efforts.

   The regulations, implemented in accordance with these Conservation Measures, are considered the principal way in which threatened eider shooting mortality will be substantially reduced or eliminated. The authority to prescribe emergency regulations provides an additional level of assurance that, should an unexpected amount of Steller's eider shooting mortality occur, it will be curtailed to avoid approaching jeopardy to the existence of the species.

   Additionally, the Service, in collaboration with North Slope partners, will routinely monitor and verify that listed eiders are not being shot and will evaluate the effectiveness of our

education, communication, and outreach efforts. If mortality is detected, the Service will reassess current outreach and education strategies, determine where changes are needed, and heighten targeted outreach and OLE efforts commensurate with the risk. If it cannot be reasonably assumed that the factors leading to shooting of Steller's eiders have been identified and adequately ameliorated, the Service's Alaska Regional Director may institute emergency regulations in consultation with AMBCC until impacts can be re-evaluated and minimized.

4.2.2.2 Spectacled Eider Subsistence Harvest Take (USFWS 2021a)

Like Steller's eiders, spectacled eiders are at risk to shooting during the subsistence harvest during their spring and fall migrations along the western coast and North Slope of Alaska. Because they often fly in mixed-species flocks, and are similar size to common and king eiders, spectacled eiders can be difficult to distinguish from other eiders that can be legally hunted; thus, they are subject to misidentification and inadvertent harvest during migration. They may also be taken by hunters who are unaware of that fact that spectacled eiders cannot be legally hunted, and by hunters not inclined to comply with species-specific closures.

In summarizing the 2021 Subsistence Harvest BO, the Service concluded that while the accuracy of harvest estimates may be affected by misidentification, reports of spectacled eider harvest in the four regions are generally consistent with known or feasible spectacled eider distribution and thus do not indicate obvious errors based on likelihood of occurrence. Several factors could bias estimates high, but it is possible that some also bias estimates low. As identified above with Steller's eiders, these biases cannot be quantified or collectively assessed, which seriously constrains the precision with which we can estimate harvest; however, these data, combined with information on spectacled eider availability, direct observations, and Traditional Ecological Knowledge (TEK) from local residents, suggest that roughly tens to hundreds of spectacled eiders are likely harvested each year, but more precise estimates are not possible with the available information.

4.2.2.3 Subsistence Loss of Eggs/Ducklings –Steller's and Spectacled Eiders (USFWS 2021a)

Subsistence harvest seasons also coincide with sensitive periods such as egg laying, incubation, and brood rearing, for both listed eider species.

Egg harvesters often target goose nests, especially those of colonially nesting species. While eiders sometimes nest near or among colonially nesting geese, nests of Steller's and spectacled eiders, are reportedly not targeted by egg collectors because they tend to nest at lower densities and their nests are cryptic. Yet, listed eiders and their nest contents could be collected or disturbed by serendipitous discovery. Therefore, the Service concluded (USFWS 2021a), given that: (1) subsistence hunting and egg collection are closed during the egg-laying and incubation stages of spectacled and Steller's eiders on their primary nesting areas (North Slope and Y-K Delta), (2) egg collectors tend to target other species, and (3) although an unknown level of bias exists, harvest surveys suggest low numbers of listed eider eggs may be collected; we estimate that the proposed subsistence regulations will result in low tens of spectacled eider eggs, and no Steller's eider eggs, collected annually throughout Alaska.

4.2.2.4 Subsistence Hunting and Lead Contamination- Steller's and spectacled eiders (USFWS 2021a)

Spring subsistence hunting may result in the deposition of lead shot into wetland habitat,

especially near communities on the Y-K Delta and North Slope. Ingestion of lead shot by listed eiders could occur during the breeding season, particularly for breeding hens and young birds foraging in shallow tundra ponds. Steller's eider females may be more vulnerable to lead poisoning than spectacled eider females during egg laying and incubation as Steller's eiders continue to forage throughout nesting, whereas spectacled eiders largely fast during incubation. Listed eider ducklings may also be exposed to spent lead when they begin foraging.

The toxic effects of lead poisoning can be both sublethal and lethal, and they vary among individuals (Hoffman 1990). Ingestion of spent lead shot has led to reduced annual survival of spectacled eiders on the Y-K Delta (Franson et al. 1995; Flint and Grand 1997; Flint et al. 1997; Grand et al. 1998; Flint and Herzog 1999). Steller's eiders breeding near Utqiaġvik showed high levels and rates of exposure (Trust et al. 1997, A. Matz, unpublished data), and 11% of long-tailed ducks (*Clangula hyemalis*) captured northeast of Teshukpuk Lake on the North Slope in 1980 had lead shot in their gizzards (Taylor 1986). Lead shot was identified as the source of high and harmful lead levels in waterfowl on the North Slope through blood samples, radiographs, necropsy, and lead isotope analysis (Matz and Flint 2009; Miller et al. 2016).

Use of lead shot for hunting waterfowl has been illegal since 1991 in Alaska, and the Service intensified efforts in 1998 to enforce prohibitions against the possession and use of lead shot for migratory bird hunting. Later, the State of Alaska, at the request of regional advisory boards, passed more restrictive regulations that prohibit the use of lead shot for upland game bird hunting on the North Slope and all bird and small game hunting on the Y-K Delta.

There are indications that compliance with these regulations has improved as a result of outreach, education, and enforcement. However, compliance varies spatially and temporally; lead shot is still occasionally found for sale in stores in rural communities, and hunters are found in possession of lead shot on the North Slope (USFWS, unpublished observations). Furthermore, permafrost under shallow water bodies may contribute to the persistence and availability of lead pellets years after deposition (Flint and Schamber 2010). Although outreach and OLE efforts may have reduced the use of lead shot over time, any spent lead shot in breeding wetlands will remain available to listed eiders for an unknown period into the future. Further, since 2016 the Service has documented stores on the North Slope and Y-K Delta stocking and selling lead shot during the spring-summer subsistence migratory bird-hunting season.

The rate of deposition of lead shot in eider breeding habitat is expected to remain relatively constant under the time frame of the proposed action (2023–2037) but take is difficult to quantify. While outreach and OLE efforts may have reduced the use of lead shot over time, any spent lead shot in breeding wetlands will remain available to Steller's and spectacled eiders for years. However, we conclude that the contribution caused only by the proposed hunts to this long-term problem will be minimal.

4.2.3 HABITAT LOSS THROUGH DEVELOPMENT AND DISTURBANCE

Destruction or modification of spectacled and Steller's eider nesting habitat and development-related disturbance have been limited and are not likely to have contributed substantially to population declines of listed eiders. However, development has likely impacted individual listed eiders by reducing available nesting and brood-rearing habitat. Human activity has likely impacted individual listed eiders through disturbance to nesting females and young, and disturbance to juveniles and adults during molt, fall and spring migration, and the wintering period.

On the Y-K Delta, long-term habitat loss from human development has been minimal (USFWS 2021a). No oil and gas or mining activities have occurred within the primary breeding area of spectacled eiders or within designed critical habitat. While there has been some population increase in the handful of communities within the Y-K Delta, village footprints have seen little expansion; and overcrowding of housing is an ongoing, significant issue (Alaska Housing Finance Corporation 2017). On the ACP, extensive oil and gas development has occurred in the Prudhoe Bay area, extending from the western border of the Arctic National Wildlife Refuge to the eastern border of the National Petroleum Reserve in Alaska. This has resulted in long-term loss of listed eider breeding habitat, directly (e.g., through gravel extraction and the building of roads and other infrastructure) and indirectly (e.g., through disturbance from oilfield activities). The actual footprint of oil and gas infrastructure is small relative to the overall geographic distribution of listed eiders on the ACP. However, oil and gas developments have gradually progressed westward across the ACP. Given ongoing industry interest in the region (expressed in lease sales, seismic surveys, and exploratory wells), industrial development farther into spectacled eider breeding habitat on the ACP is likely to continue.

Additionally, community populations on the ACP, including that of Utqiaġvik, have been increasing. With the development of community infrastructure, listed eiders likely have experienced some loss of reproductive potential from direct and indirect habitat loss. Overall, direct, long-term habitat loss on the ACP due to both community and oil and gas development has not had a major impact on the core area of spectacled and Steller's eider terrestrial habitat in this region to date, but may be a concern in the future with continued expansion. Similar data due to community infrastructure and industrial development is unavailable for Arctic Russia. However, this region of Russia is generally characterized as remote and sparsely populated.

Disturbance from human activities may affect individual listed eiders in a variety of ways, including by forcing birds to move away from preferred foraging, nesting, and brood-rearing habitats; by flushing incubating birds off nests or hens away from broods, increasing vulnerability of eggs and young to exposure and predation; and finally by reducing adult survival if disturbance is frequent and/or in combination with other stressors. It is unknown to what degree spectacled and Steller's eiders can reproduce successfully in disturbed areas, or move to less-disturbed areas to successfully reproduce. The likelihood that disturbance from activities associated with human development is currently affecting spectacled and Alaska-breeding Steller's eiders at the population-level is low, given their wide breeding distribution versus the relatively limited human footprint within the Action Area and Arctic Russia. However, as infrastructure expands, the overall effect of disturbance and habitat loss may increase.

4.2.4 ENVIRONMENTAL CONTAMINANTS

Deposition of lead shot in tundra wetlands and shallow marine habitat where eiders forage is considered a threat to listed eiders, and also affects the suitability of designated critical habitat. Lead poisoning has been documented in spectacled eiders on the Y-K Delta (Franson et al. 1995; Grand et al. 1998; Flint et al. 2016) and in Steller's eiders on the ACP (Trust et al. 1997; USFWS unpublished data). The use of lead shot in waterfowl hunting has been prohibited in the United States since 1991. On the ACP and Y-K Delta, lead shot is prohibited in the hunting of all bird species (banned by the State of Alaska at the request of regional advisory boards in 2006 and 2007, respectively), and on the Y-K Delta (where critical habitat is designated for both listed eiders) it is also prohibited. It is hypothesized that lead poisoning has contributed to population declines of both Steller's and spectacled eiders, but to what extent ingestion of lead shot has impacted either species, on its own or in combination with other stressors, is unknown. While

the use of lead shot appears to be declining in the Action Area, there is evidence lead shot is still available for purchase in some communities adjacent to habitats used by listed eiders (including designated critical habitat; USFWS, unpublished observations). Waterfowl will presumably continue to be exposed to residual lead shot in the environment annually and for some time into the future, and lead exposure will continue to be a factor affecting listed eiders and the suitability of designated critical habitat on the Y-K Delta.

Other contaminants, including petroleum hydrocarbons from local sources or globally distributed heavy metals, may also affect listed 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 in areas of industrial development, including the Colville River Delta, may be exposed to petroleum hydrocarbons, heavy metals, and other contaminants. Steller's eiders may also have increased exposure to contaminants, including hydrocarbons and trace elements (Lovvorn et al. 2013, Miller et al. 2016, USFWS 2019), during the non-breeding season. Their marine molting and wintering areas are often adjacent to areas with concentrated human infrastructure, and they have a tendency to flock in harbors (USFWS 2019). Vessel traffic and industrial development also pose a risk of hydrocarbon exposure as a result of oil spills to the marine environment, including to critical habitat designated for both species. Overall, risk of contaminant exposure and potential affects to listed eiders and critical habitat in the Action Area are unmeasured. With vessel traffic and industrial development increasing within the marine habitats used by listed eiders, risk of hydrocarbon and other contaminant exposure will also increase.

4.2.5 INCREASED PREDATOR POPULATIONS

Human development within the range of spectacled and Steller's eiders may artificially increase the availability of food and nest/denning sites for avian and mammalian predators, thereby driving predator population increases and indirectly increasing predation on listed eiders and their eggs. Human-made structures provide denning sites for foxes and nest sites for ravens, which have allowed them to expand their range to parts of the ACP and Y-K Delta where they were not found prior to human development (Eberhardt et al. 1983; Day 1998; Powell and Backensto 2009; USFWS, unpublished observations). Reduced fox trapping on the ACP and increased anthropogenic food sources in developed areas of both regions (e.g., from landfills and marine mammal carcasses) may support higher gull, raven, and fox populations than were historically present (Day 1998, Powell and Backensto 2009). On the Y-K Delta, where critical habitat has been designated in spectacled and Steller's eider nesting areas, predator populations may be increasing but at lower rates than on the ACP (USFWS 2021c). No systematic surveys of nest predators are conducted in Arctic Russia, but observations at Chaun suggest the population of large gulls may have increased over the past three decades (Solovyeva and Zelenskaya 2016) and may have resulted in higher spectacled eider nest predation rates (Solovyeva et al. 2018). In addition, Steller's eiders may experience predation pressure from bald eagles (Haliaeetus leucocephalus) in their molting and wintering areas (USFWS 2019). Where eagle populations are artificially inflated as a result of anthropogenic food attractants (e.g., offal from fish processing facilities), human activity may contribute to some unmeasured level of increased predation pressure on Steller's eiders, including in designated critical habitat.

Individual spectacled and Steller's eiders in the vicinity of communities and industrial areas have likely been impacted by increased predator populations. Ravens are highly efficient egg predators (Day 1998) and have been observed depredating Steller's eider nests near Utqiaġvik (Quakenbush et al. 2004). Steller's eider research near Utqiaġvik has attributed poor breeding

success to high predation rates (Obritschkewitsch et al. 2001). It is possible increased predator populations have had consequences at the population-level, but the overall severity of impacts has been difficult to quantify. While some localized efforts have been made to reduce predator populations that have increased due to anthropogenic subsidies, there is no information regarding the effectiveness of these measures (USFWS 2021c). As the number of anthropogenic attractants increases near breeding populations of listed eiders, reproductive success of listed eiders may decrease, and population-level effects may become more apparent.

4.2.6 HARVEST, INCLUDING EGGING AND SHOOTING

An unknown level of incidental and intentional harvest of listed eiders and their eggs occurs in both Alaska and Russia. Regulatory mechanisms and outreach/education efforts may lower harvest of listed eiders and their eggs in the future, but to our knowledge such efforts are confined to Alaska and have not occurred in Russia. Spectacled and Steller's eiders may be harvested during migration, during the breeding period on the tundra, or in the marine staging and molting areas.

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 on the ACP by the Service, North Slope Borough (NSB), and BLM to encourage compliance. However, annual harvest surveys indicate that some listed eiders continue to be incidentally taken during subsistence activities in the NSB. Although local knowledge suggests spectacled and Steller's eiders have not been specifically targeted for subsistence, listed eiders may be subject to misidentification and inadvertent harvest. They could also be taken if hunters are unaware of species-specific closures, or they could be taken deliberately (USFWS 2021c). Ongoing efforts to help subsistence users avoid incidental harvest are being implemented in NSB villages, particularly in Utqiaġvik where the perceived risk for Steller's eiders is greatest due to their relatively high rates of occurrence and occupancy in areas commonly used for hunting. Similar outreach is not conducted on the Y-K Delta at this time.

The harvest of spectacled eiders is legally prohibited in Russia, as is any activity that may result in habitat degradation or a reduction in numbers (USFWS 2021c). Exceptions include subsistence purposes for indigenous people. We do not have reliable information on the enforcement of harvest regulations and harvest levels in Russia (USFWS 2021c).

4.2.7 COLLISIONS WITH STRUCTURES

Migratory birds suffer considerable risk from collisions with human-made structures (Manville 2005), including light poles, buildings, drill rigs, towers, wind turbines, and overhead powerlines. Collisions can cause immediate mortality, injury leading to death, or temporary injury. A study in the Prudhoe Bay oil fields found that collision rate along a 7.8-mile power line during 1986 and 1987 was related to flight height (Anderson and Murphy 1988). Johnson and Richardson (1982) reported that 88 percent of eiders observed in a study along the Beaufort Sea coast flew below an estimated altitude of 32 feet, and well over half flew below 16 feet. Day et al. (2003) estimated a mean flight altitude of 6 feet for eider species flying past St. Lawrence Island, Alaska in the fall. This tendency to fly low puts eiders at risk of striking even relatively low objects in their path.

Listed eiders are most at risk of collision with structures on the breeding grounds and during migration. Human structures, including buildings and powerlines, are sparse and limited on the

Y-K Delta, and collision risk to listed eiders is not significant in this region, including within designated critical habitat. Relative to the Y-K Delta and Arctic Russia spectacled eider breeding populations, ACP-breeding spectacled and Steller's eiders likely have a higher collision risk due to more extensive human development in the Prudhoe Bay oil fields, near Utqiaġvik, and along the Beaufort Sea coast, where several offshore oil facilities are operating or in construction. While systematic surveys have not been conducted, low numbers of spectacled eider collisions with powerlines or structures were documented from 1991 to 2019 near Utqiaġvik and in Prudhoe Bay (USFWS, unpublished data). Multiple wire strike mortalities have also been documented near Utqiaġvik for Steller's eiders (USFWS 2019).

It is difficult to measure the population-level effect of collisions on listed eiders. Several factors confound accurate collision estimates, including (1) annual variation in eider density and distribution; (2) how feature configurations (e.g., presence or absence of guy wires) contribute to avian attraction, disorientation, and collision; and (3) how variations in weather and lighting conditions affect probability of collisions. The Service consults with Federal agencies on most industrial and community development on the ACP and seeks to minimize collision risk through various measures (including design considerations, such as avoiding the use of guyed towers, keeping lighting to a minimum). Nevertheless, some unknown level of collision risk remains over the life of human-made infrastructure, and evidence suggests some individual spectacled eiders are killed annually by collisions. Development is projected to increase on the ACP and along the coast of Arctic Russia in the future (BOEM 2018, Rosneft 2020), which will likely increase the risk of collisions for listed eiders.

4.2.8 VESSEL DISTURBANCE AND COLLISIONS

Vessels used for shipping, fishing, research, and tourism transit through listed eider marine habitats, including migration corridors, molting areas, and wintering areas. The majority of spectacled eider marine habitat, including designated critical habitat in molting areas in Norton Sound and Ledyard Bay and the wintering area southwest of St. Lawrence Island, has historically had low levels of vessel traffic (USFWS 2021c). Steller's eiders may encounter higher levels of marine vessel traffic, including throughout their molting and wintering range designated as critical habitat, due to their presence near harbors and fish processing facilities, such as those on Kodiak Island and at Dutch Harbor (USFWS 2019).

In the marine environment, Steller's eiders may have a lower risk of collision than spectacled eiders, due to their tendency to use nearshore habitats (USFWS 2019). Birds may be most at risk of vessel disturbance and collision during molt, when they have limited ability to move away and are under higher energetic demand, and during winter, when light and weather conditions might contribute to risk (USFWS 2021c). Some vessel traffic is subject to consultation with the Service; and for those that consulted, the Service recommends measures to mitigate disturbance and risk of collision. Recommended measures include reduced vessel speed or avoiding major molting areas during the molting period. As vessel traffic increases, disturbance and collisions may become more of a concern for both listed eiders, including in designated critical habitat.

4.2.9 RESEARCH

Field-based scientific research has also intensified in the Action Area in response to interest in climate change and its effects on arctic ecosystems. While some activities have no impact on listed eiders (e.g., a project that occurs when eiders are absent or employs remote sensing tools), other activities could have negative direct (e.g., through nest trampling or collection of

eiders or their eggs) and indirect (e.g., through disturbance) effects. Activities that could affect listed eiders through disturbance include aerial surveys, on-tundra activities, or remote aircraft landings. Many of these activities are considered in intra-Service consultations, or under a programmatic consultation with the BLM for summer activities in the National Petroleum Reserve in Alaska.

The Service has also issued permits under section 10 of the ESA to authorize take of endangered or threatened species for the purpose of propagation, enhancement, or survival. Since 1993, annual reporting requirements associated with section 10 permits for spectacled eiders indicate that approximately 11 spectacled eider adults and 5 eggs have been taken as an indirect result of research activities.

From 1997 to present, the Service estimates that approximately 1 Steller's eider from the listed Alaska-breeding population has been lethally taken incidental to research activities (based on a total of 37 Steller's eiders reportedly taken from the un-listed Pacific-wintering population, incidental to research activities, where Alaska-breeding Steller's eiders comprise an estimated 1 percent of the Pacific-wintering population). Intentional take of adult Alaska-breeding Steller's eiders is unlikely to have occurred since listing, but there have been 16 adult Pacific-wintering Steller's eiders taken under permits. Additionally, permits were issued to opportunistically collect up to 68 Steller's eider eggs from the Alaska-breeding population for a captive breeding program at the Alaska SeaLife Center; 31 eggs were taken before collecting ceased. The Steller's eiders taken in these research programs were used to increase scientific knowledge of the species' biology, and the eggs were used to establish a captive breeding population for use in research and recovery efforts.

4.2.10 DISEASE, PARASITES, BACTERIA, AND BIOTOXINS

Listed eiders may be affected by naturally occurring diseases, parasites, and biotoxins (e.g., from harmful algal blooms) through a direct effect on individuals or through impacts to food quality (USFWS 2019, 2021b). Steller's eiders may additionally be exposed to increased levels of the pathogenic E. coli bacteria due to their proximity to fish processing facilities during winter (Hollmén et al. 2010, USFWS 2019). Exposure may result in a one-time, temporary effect to individuals, or exposure may be chronic and affect future reproductive potential and survival (USFWS 2019). The effects of disease, parasites, toxins, and bacteria to individual eiders have not been evaluated, and studies on population-level effects of these stressors on sea ducks are lacking (Hollmén and Franson 2015; USFWS 2019, 2021b).

4.2.11 CLIMATE CHANGE

The environmental baseline includes consideration of ongoing and projected changes in climate, using terms as defined by the Intergovernmental Panel on Climate Change (IPCC). 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).

Globally, climate change is characterized by warming atmospheric and ocean temperatures, diminishing snow and ice cover, and rising sea levels (IPCC 2014). High latitude regions such as the ACP, Arctic Russia, and even the subarctic Y-K Delta are thought to be especially sensitive to effects of climate change (Quinlan et al. 2005; Smol et al. 2005; Schindler and Smol 2006). Climate change will likely have impacts at multiple scales (e.g., at the level of individual

organisms and the community level), but it is difficult to predict with certainty how 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 components (Hinzman et al. 2005).

Marine Environment – The North Pacific Ocean, including the Bering Sea, is subject to longer-term cycles in oceanic conditions, such as the Pacific Decadal Oscillation, and regime shifts that are defined by rapid changes in ecosystem structure. We do not have adequate information to characterize the effects of marine regime shifts on listed eiders (USFWS 2021c), but signals of regime shifts include alterations to primary productivity, invertebrate populations, and fisheries that then persist at a decadal time scale (Overland et al. 2008).

Despite regime shifts over decadal scales, data suggests the North Pacific Ocean and Arctic Ocean, which includes the Beaufort, Chukchi, and East Siberian Seas, may be warming overall. Over large areas of the seasonally ice-free Arctic, summer sea surface temperatures have increased around 0.5°C per decade from 1982 to 2017 (IPCC 2019). Trend analyses of the Chukchi Sea have shown warming over the past 96 years, and the rate of warming has increased in recent decades (Danielson et al. 2020). Historically, the climate of the Bering Sea has shifted from alternating warm and cold years, but more recently has been dominated by multi-year warm periods (Stabeno et al. 2012). Climate-induced changes in sea surface temperature may have cascading effects to the marine ecosystem, including negative effects on bivalves that result from a corresponding increase in ocean acidification. An indirect effect of climate change to spectacled and Steller's eiders may therefore be a decrease in the abundance of benthic bivalve prey in marine habitats. Additionally, climate change could have impacts to eelgrass habitat, such as that in Izembek Lagoon, which may affect Steller's eiders (USFWS 2019).

Arctic sea ice, including that in the Chukchi, Beaufort, and Bering seas, has been declining in extent and concentration in recent decades (IPCC 2019). Changes in sea ice are particularly apparent in the Bering Sea, and it is very likely that projected Arctic warming will result in a continued loss of sea ice in the future (USFWS 2021c). A reduction or disappearance of sea ice during portions of the winter could affect spectacled eiders by requiring them to remain in open water rather than use sea ice as a resting platform. Spectacled eiders may also have to contend with more extreme wave conditions in the absence of sea ice and its dampening effect. Both factors may directly affect spectacled eiders by increasing energetic requirements during winter, with possible negative effects to body condition, reproduction, and even survival (Lovvorn et al. 2009). In addition, with extended open water season and increased extent of open water in the Bering and southern Chukchi seas, vessel traffic is expected to increase, which increases the risk to listed eiders of collisions, disturbance, and oil spills.

Climate-related changes in the marine environment could reduce the suitability of designated critical habitat for spectacled and Steller's eiders. We do not know whether listed eiders might behaviorally adapt to such ecosystem changes by moving to new habitat. Data show at least some portion of the spectacled eider wintering population may move north in response to sea ice retreat (USFWS 2021c), but we do not know how northward migration affects subsequent survival or reproductive capacity.

Terrestrial and Freshwater Environment – A wide variety of climate-related changes are also occurring in terrestrial habitats across the circumpolar Arctic, including tundra areas where listed eiders nest and raise broods. Some impacts from increasing air temperatures in the sub-Arctic and Arctic include erratic weather patterns, changing snow conditions, increased pond

temperatures that could influence primary productivity and invertebrate communities, permafrost degradation and erosion contributing to declines in pond area and abundance, and storm surge flooding that increases salinity in freshwater ponds.

Listed eiders depend on landscapes dominated by freshwater wetlands for foraging and brood rearing (Quinlan et al. 2005). Water bodies in subarctic and arctic tundra are draining in response to thawing permafrost (Oechel et al. 1995; Smith et al. 2005), or due to increased evaporation and evapotranspiration during prolonged ice-free periods (Schindler and Smol 2006; Smol and Douglas 2007). Such climate-related changes could have cascading effects to the reproductive success of listed eiders. Changes in water chemistry or temperature are altering nutrient loads, primary productivity, and invertebrate communities that form the basis of the arctic food web (Chapin et al. 1995; Hinzman et al. 2005; Quinlan et al. 2005; Smol et al. 2005; Lougheed et al. 2011). We do not know how these changes act singularly or in combination to affect the quality of nesting or brood-rearing habitat; affect the aquatic invertebrate community that the listed eiders depend on for food; or whether these changes contribute to phenological mismatches between listed eiders and their tundra wetland invertebrate prey stock (USFWS 2021c).

In the Utqiaġvik Triangle, there has been a 30.3 percent net decrease in pond area and a 17.1 percent decrease in pond abundance from 1948 to 2010 (Andersen and Lougheed 2015), and there is strong evidence that permafrost loss caused by climate change is decreasing large lake area and abundance in areas with discontinuous permafrost, including parts of subarctic Alaska (Riordan et al. 2006). Permafrost degradation could also contribute to a decrease in tundra pond habitat for nesting and brood-rearing eiders in areas with continuous permafrost, such as the ACP and Arctic Russia. The low-relief Y-K Delta could also be susceptible to impacts from an increase in the magnitude and frequency of coastal storm surges and storm-driven flood ties (Jorgenson and Ely 2001, IPCC 2014); and increased storminess may be exacerbated by a reduction in sea ice coverage, which has a dampening effect on wave action (IPCC 2014). During flood-tide events in this region, coastal lakes and low-lying wetlands are often breached, altering soil/water chemistry as well as floral and faunal communities (USGS 2006; Terenzi et al. 2014). The frequency and magnitude of coastal storm surges is expected to continue increasing (IPCC 2014). When coupled with softer, semi-thawed permafrost, reductions in sea ice have also significantly increased coastal erosion rates (USGS 2006). The overall effect may be a reduction in available coastal tundra habitat over time, especially on the Y-K Delta. Critical habitat has been designated on the Y-K Delta for both listed eiders, and impacts in this region could be detrimental, especially to the nesting success of spectacled eiders (USFWS 2021c).

Changes in precipitation patterns and air and soil temperatures are also affecting terrestrial ecosystems in the subarctic and Arctic (Chapin et al. 1995; Hinzman et al. 2005; Prowse et al. 2006). Snow cover duration in the Arctic is projected to decrease 5 to 25 percent by the end of the century (IPCC 2019), while total precipitation and rain-on-snow events are expected to increase (IPCC 2014, ACIA 2004). These conditions may affect microtine populations (Aars and Ims 2002, Kausrud et al. 2008, Gilg et al. 2009), with possible cascading effects to predator-prey dynamics and other changes throughout the tundra ecosystem (USFWS 2021c). Additionally, changing weather patterns could expose listed eiders to harsher weather during the breeding season, which could increase energy requirements and/or impact reproductive effort and success (USFWS 2019).

While the impacts of climate change are ongoing, and the ultimate effects on listed eiders and critical habitat within the Action Area are unclear, climate-related changes in habitats used by each species throughout the annual cycle are predicted to continue. Some species may adapt

and thrive under changing environmental conditions, while others decline or suffer reduced biological fitness. Species with small populations are more vulnerable to the impacts of environmental change (Crick 2004), but the net effect of climate-related changes to spectacled and Steller's eiders remains to be measured.

5.0 EFFECTS OF THE ACTION

Effects of the action are the direct and indirect effects of the proposed action on the species or its critical habitat and the effects of any interrelated or interdependent activities.

5.1 WHOOPING CRANE

The most likely adverse effect to whooping cranes that would be caused by establishing hunting regulations for certain migratory game birds is accidental death or injury caused by hunters who confuse whooping cranes with other species of migratory game birds that may be lawfully hunted. The cranes' migratory routes and wintering area in Texas are located in areas where hunting is allowed. The migration of whooping cranes and migratory bird hunting seasons have a considerable amount of overlap. The fall migration for whooping cranes starts in mid-September and may continue until mid-December (with occasional stragglers arriving at the southern terminus as late as early January) and the hunting season can last from September 1 until March 10, although most seasons are concluded by the first week in February. In the past, whooping cranes have been shot when mistaken for geese or sandhill cranes, especially one-half hour before sunrise. Often, whooping cranes have been confirmed in snow goose or sandhill crane hunt areas in the Dakotas, Nebraska, Kansas, Oklahoma, Colorado, Kentucky, Tennessee, Louisiana, Alabama, Mississippi, and Texas. These birds were monitored and, in some instances a small area was closed to hunting until they departed.

5.1.1 SANDHILL CRANE HUNTING

5.1.1.1 Mid-Continent and Rocky Mountain Populations of Sandhill Cranes

State regulatory mechanisms in Texas, Oklahoma, and Kansas as well as other States have been implemented to provide legal protection for whooping cranes during sandhill crane hunting. Cranes (the Family Gruidae) are protected internationally under the migratory bird conventions between the United States and Canada (1916) and between the United States and Mexico (1937). Hunting of migratory birds in the United States is regulated by the Migratory Bird Treaty Act (40 Stat. 755; 16 U.S.C. 703) which gives effect to the international treaties. Migratory birds defined as "game birds" in the terms of these conventions and Migratory Bird Treaty Act are listed in section 20.11 of Part 1, Title 50, Code of Federal Regulations and include the Family Gruidae. The treaty with Canada in 1916 listed "Gruidae or cranes, including little brown, sandhill, and whooping cranes." Subsequently, the little brown crane and sandhill cranes were shown to be subspecies of a single species (Oberholser 1921); it also was shown that there are intermediates between the lesser and greater subspecies. The "little brown crane" is now called the lesser sandhill crane; the "sandhill crane" is now called the greater sandhill crane. The intermediate population had been described and named the Canadian sandhill crane (Walkinshaw 1965). Genetic studies suggest that genotypically there likely are only two subspecies, the lesser and the greater sandhill crane (Rhymer et al. 2001, Petersen et al. 2003, Jones et al. 2005).

A general closed season was established on all cranes in the United States May 20, 1916, and remained in effect until January 1, 1961, when the Federal government authorized a 30-day season on lesser sandhill cranes in eastern New Mexico and western Texas. Texas was unable to participate at that time since cranes were not classified as game birds by State statute. This reinstatement of sandhill crane hunting in New Mexico was followed by 30-day seasons in Alaska (September 1-30) and west Texas (November 4-December 3) in 1961. Minor changes were made in subsequent seasons in these States. The area open to hunting in New Mexico and Texas was enlarged slightly, and the hunting period in Alaska was increased to 45 days

during the 1964-65 season. In 1967, hunting was permitted in the Central Flyway portion of Colorado, exclusive of the San Luis Valley and, in the following year, in western Oklahoma, the eastern portion of the Texas panhandle, and prescribed areas of North Dakota and South Dakota. In 1972, hunting was permitted in prescribed areas of Montana and Wyoming and in 1993 Kansas initiated its first sandhill crane hunting season. The birds have been legally hunted in Mexico at least since 1940 and in portions of Canada since 1959.

Concern over the impact hunting may have on populations of sandhill cranes prompted the Service to initiate a special sandhill crane hunting permit system during the 1975–76 hunting season. The permits were supplied to the States by the Service and were issued free to hunters upon request. Each permit holder was mailed a questionnaire at the close of the hunting season. The questionnaire included inquiries about the number of days hunted, number of cranes harvested, numbers crippled, counties hunted, and information on the identification of whooping cranes. One follow-up questionnaire was mailed to non-respondents about 3 weeks after the first mailing. Non-respondents to the follow-up were assumed to have the same average hunting activity and harvests as respondents, and reported harvests have been expanded accordingly.

The implementation of point-of-sale electronic records and Internet-based license issuing systems in Colorado, Texas, and North Dakota compromised the mandatory exposure of sandhill crane hunters to whooping crane identification materials. Therefore, States began to publish information on whooping crane identification in their hunting brochures.

Since sandhill crane hunting was resumed in 1961, the Service and the Central Flyway have adopted a risk-averse approach in the expansion of sandhill crane hunting opportunities. This approach was adopted to ensure protection for the various breeding stocks of Mid-Continent Population sandhill cranes, address anti-crane hunting concerns, and to protect the recovering Aransas-Wood Buffalo Population of whooping cranes. With respect to conflicts in sandhill crane hunting and whooping cranes, the development and implementation of hunter education and awareness programs was the primary tool adopted in the Flyway. In some cases, hunting seasons within States were adjusted within Federal frameworks to reduce potential conflicts between use of areas by whooping cranes and hunting. Sandhill crane hunting seasons in Canada and the United States in the migration corridor were originally seasonally timed or geographically limited to protect whooping cranes (Buller 1967, Archibald et al. 1976, Thompson and George 1987). Recent expansions of sandhill crane hunting seasons offer an increased potential for overlap with whooping crane migration periods that may have increased the risks to whooping cranes (Konrad 1987, Brian Johns, CWS, personal communication), but increased incidences of hunters shooting whooping cranes has not been observed. Finally, the use of the State-Federal Contingency Plan (Whooping Crane Committee 2006) was implemented to provide additional protection of whooping cranes at site-specific areas within a state.

All Central Flyway States, except Nebraska, allowed crane hunting in portions of their States during 2021-22. An estimated 21,101 Central Flyway hunters participated in these seasons, which was 23% lower than the number that participated in the previous season for the same states. Hunters harvested 59,565 MCP cranes in the U.S. portion of the Central Flyway during the 2021-22 seasons (Seamans 2022).

The estimated retrieved harvest of MCP cranes in hunt areas outside of the Central Flyway (Arizona, Pacific Flyway portion of New Mexico, Minnesota, and Alaska combined) was 3,207 birds during 2021-22 (Seamans 2022). Data from Canada and Mexico was not available for the 2021-2022 season. The most recent year with data from Canada and Mexico was the 2019-

2020 season. During that year the estimated retrieved harvest of MCP cranes in hunt areas outside of the Central Flyway was 22,600 birds. The preliminary estimate for the North American MCP sport harvest, including crippling losses, was 62,849 birds during the 2019-2020 season. The long-term (1982-2019) trends for the MCP indicate that harvest has been increasing at a higher rate than population growth. The fall 2021 pre-migration survey for the Rocky Mountain Population (RMP) counted 23,963 cranes, 7% lower than the count from 2020. The 3-year average was 23,630 sandhill cranes, which exceeds the established population objective of 17,000–21,000 for the RMP. Hunting seasons during 2021–22 in portions of Arizona, Idaho, Montana, New Mexico, Utah, and Wyoming resulted in a harvest of 1,435 RMP cranes, an 81% increase from the previous year's harvest. The Lower Colorado River Valley Population (LCRVP) survey results indicated a 36% decrease from 2021 (5,883 birds) to 2022 (3,787 birds). The 3-year average is 4,204 LCRVP cranes, which is above the population objective of 2,500 birds (Seamans 2022).

5.1.1.2 Eastern Population of Sandhill Cranes

The Eastern Population (EP) of sandhill cranes has rebounded from near extirpation in the late 1800's (Walkinshaw 1949, 1973; Leopold 1949). Management actions, such as regulating take and the protection and restoration of habitat, have allowed this population to increase from about 14,000 cranes in 1979 to 90,000 cranes in 2021 (Seamens 2022). The majority of EP cranes breed across the Great Lakes region (Wisconsin, Michigan, Ontario, and Minnesota); however, the range of this population is currently expanding in all directions. By early fall, EP cranes leave their breeding grounds and congregate in large flocks on traditional staging areas throughout the breeding range. During migration, EP cranes use traditional stopover areas including the Jasper-Pulaski Fish and Wildlife Area in northwestern Indiana and the Hiawasse State Wildlife Refuge in southeastern Tennessee. Historically, the EP has wintered in southern Georgia and in Florida. More recently some cranes have wintered further north into Kentucky and Tennessee (Walkinshaw 1973, Lewis 1977, Tacha et al. 1992, Meine and Archibald 1996).

According to the EP management plan, hunting seasons for EP cranes would be offered if the three-year average fall survey estimate was above 30,000 cranes. When the three-year fall survey average falls below 30,000, the hunting season will be closed and will remain closed until the three-year fall survey average exceeds 30,000 (Ad Hoc Eastern Population Sandhill Crane Committee. 2010). The Service recognizes that utilization of a three-year population trend estimate to guide season closures may mask a precipitous one year drop in the EP crane population index. In such cases, the Service will hold discussions with Flyway Councils to assess the biological ramifications of the population index change and consider what options, including season closure, should be considered in such a situation.

In 2010, the Mississippi and Atlantic Flyway Councils endorsed a management plan for EP cranes (Ad Hoc Eastern Population Sandhill Crane Committee 2010). One of the plan's provisions included guidelines for potential harvest of this population when the 3-year average of the fall survey is above 30,000 cranes. Kentucky and Tennessee initiated experimental hunting seasons in 2011 and 2013, respectively; the season in Kentucky became operational in 2015 and that for Tennessee in 2017. Alabama initiated an experimental season beginning in the 2019-20 season. Seasons are allowed between September 1 and January 31 and have a maximum length of 60 days. Actual season dates have been from mid-December to mid-January in Kentucky and late November to late January in Tennessee. According the hunt plan, each state is allowed to issue a number of tags to hunters based on each state's five-year average peak crane abundance. According to the hunt plan, the number of tags a state can issue cannot exceed 10% of the state's five-year average peak crane abundance. Each tag

allows a hunter to harvest one crane. Hunters in all three states are required to complete mandatory crane identification training, tag and report harvested birds, and complete a post-season survey. In Kentucky, 534 tags were issued and hunters harvested 50 cranes during the inaugural season in 2011-12 (Seamans 2022). In the 2021-22 season, 1,029 hunters harvested 117 cranes. Harvests in Tennessee have increased from 350 cranes during their initial season to 484 birds in 2021-22, and Alabama hunters harvested 291 cranes during their inaugural season and 234 in 2021-22. The total number of Eastern Population sandhill cranes harvested during 2021–22 hunting seasons was 835 birds. The Eastern Population (EP) sandhill crane fall survey index for 2021 (90,029) was a 5% decrease from the previous year, but still well above the objective of 30,000 cranes for this population (Seamans 2022).

5.1.1.3 The 2022-23 Federal Framework for Sandhill Crane Hunting

Regular Seasons in the Mississippi Flyway

Outside Dates: Between September 1 and February 28 in Minnesota, and between September 1 and January 31 in Alabama, Kentucky, and Tennessee.
Hunting Seasons: A season not to exceed 37 consecutive days may be selected in the designated portion of northwestern Minnesota (Northwest Goose Zone), and a season not to exceed 60 consecutive days in Alabama, Kentucky, and Tennessee.
Daily Bag Limits: 1 sandhill crane in Minnesota, 2 sandhill cranes in Kentucky, and 3 sandhill cranes in Alabama and Tennessee. In Alabama, Kentucky, and Tennessee, the seasonal bag limit is 3 sandhill cranes.
Permits: Each person participating in the regular sandhill crane seasons must have a valid Federal or State sandhill crane hunting permit.
Other Provisions: The number of permits (where applicable), open areas, season dates, protection plans for other species, and other provisions of seasons must be consistent with the Council management plans and approved by the Mississippi Flyway Council. The season in Alabama is experimental.

Regular Seasons in the Central Flyway

Outside Dates: Between September 1 and February 28.
Hunting Seasons: Seasons not to exceed 37 consecutive days may be selected in designated portions of Texas (Zone C). Seasons not to exceed 58 consecutive days may be selected in designated portions of the following States: Colorado, Kansas, Montana, North Dakota, South Dakota, and Wyoming. Seasons not to exceed 93 consecutive days may be selected in designated portions of the following States: New Mexico, Oklahoma, and Texas.
Daily Bag Limits: 3 sandhill cranes, except 2 sandhill cranes in designated portions of North Dakota (Area 2) and Texas (Zone C).
Permits: Each person participating in the regular sandhill crane season must have a valid Federal or State sandhill crane hunting permit.

Special Seasons in the Central and Pacific Flyways Areas:

Arizona, Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming may select seasons for hunting sandhill cranes within the range of the Rocky Mountain Population (RMP) subject to the following conditions:
Outside Dates: Between September 1 and January 31.
Hunting Seasons: The season in any State or zone may not exceed 60 days, and may be split into no more than 3 segments.
Bag limits: Not to exceed 3 daily and 9 per season.
Permits: Participants must have a valid permit, issued by the appropriate State, in their

possession while hunting.
Other Provisions: Numbers of permits, open areas, season dates, protection plans for other species, and other provisions of seasons must be consistent with the Council's management plan and approved by the Central and Pacific Flyway Councils, with the following exceptions:
A. In Utah, 100 percent of the harvest will be assigned to the RMP crane quota;
B. In Arizona, monitoring the racial composition of the harvest must be conducted at 3-year intervals unless 100 percent of the harvest will be assigned to the RMP crane quota;
C. In Idaho, 100 percent of the harvest will be assigned to the RMP quota; and
D. In the Estancia Valley hunt area of New Mexico, the level and racial composition of the harvest must be monitored; greater sandhill cranes in the harvest will be assigned to the RMP crane quota.

5.1.2 SPECIAL MEASURES TAKEN BY STATES TO PROVIDE ADDITIONAL PROTECTION TO WHOOPING CRANES

In response to an illegal hunt conducted in 2004, and to reduce the chance of shooting a whooping crane during the migratory game bird hunting seasons, the State of Kansas implemented the following:

1) Delayed the initiation of the statewide sandhill crane hunting season in Kansas from the first Saturday in November to the first Wednesday after the first Saturday in November. However, beginning with the 2021-2022 season, two sandhill crane hunting zones were established (a West Zone and a Central Zone) (Kansas Department of Wildlife and Parks 2021). The open season for the taking of sandhill crane in the West Zone shall begin on the third Saturday in October (Kansas Administrative Regulations 115-25-20).
2) Developed a mandatory web-based species identification test for Kansas sandhill crane hunters which must be completed each year.
3) Included graphics of whooping crane "look-alike" species, warnings about the fines associated with the take of an endangered species and the web site address that has been developed for sandhill crane and waterfowl hunters in the Kansas Department of Wildlife and Parks Annual Hunting Guides (Kansas Department of Wildlife and Parks 2022).
4) Continue to work with the Central Flyway Council on information that can be distributed throughout the Central Flyway.
5) Increased the presence of OLE officers in the field in areas containing whooping cranes in Kansas.

The Current Kansas Sandhill crane regulations state:

115-25-20. Sandhill crane; management unit, hunting season, shooting hours, bag and possession limits, and permit validation.

a) The open season for the taking of sandhill crane in the central zone shall begin on the Wednesday after the first Saturday in November and shall continue for 58 days, including the opening day. The open season for the taking of sandhill crane in the west zone shall begin on the third Saturday in October and shall continue for 58 days, including the opening day.
b) The following areas shall be open for the taking of sandhill crane during the established hunting season:
    1) Central zone: that part of Kansas bounded by a line from the junction of interstate

highway I-35 and the Oklahoma-Kansas state line, then north on interstate highway I-35 to its junction with interstate highway I-135, then north on interstate highway I-135 to its junction with interstate highway I-70, then north on federal highway US-81 to its junction with the Nebraska-Kansas state line, then west on Nebraska-Kansas state line to its junction with federal highway US-283, then south on federal highway US-283 to its junction with state highway K-24, then east on state highway K-24 to its junction with state highway K-18, then southeast on state highway K-18 to its junction with federal highway US-183, then south on federal highway US-183 to its junction with state highway K-1, then south on state highway K-1 to its junction with the Oklahoma-Kansas state line, and then east on the Oklahoma-Kansas state line to its junction with interstate highway I-35, except federal and state sanctuaries.

2) West zone: that part of Kansas bounded by a line from the junction of federal highway US-283 and the Nebraska-Kansas state line, then south on federal highway US-283 to its junction with state highway K-24, then east on state highway K-24 to its junction with state highway K-18, then southeast on state highway K-18 to its junction with federal highway US-183, then south on federal highway US-183 to its junction with state highway K-1, then south on state highway K-1 to its junction with the Oklahoma-Kansas state line, then west on the Oklahoma-Kansas state line to its junction with the Colorado-Kansas state line, then north on the Colorado-Kansas state line to its junction with the Nebraska-Kansas state line, and then east on the Nebraska-Kansas state line to its junction with federal highway US-283, except federal and state sanctuaries.

c) Shooting hours shall be from sunrise until sunset.
d) The daily bag limit shall be three sandhill cranes.
e) The possession limit shall be nine sandhill cranes.
f) Each person hunting sandhill cranes in Kansas shall possess a federal sandhill crane hunting permit that has been issued through and validated by the department. Except as specified in subsection (g), any individual may secure a federal sandhill crane hunting permit upon application to the department and payment of the sandhill crane permit validation fee.
g) Each person wanting to hunt sandhill cranes in Kansas shall be required to pass an annual, online sandhill crane identification examination before meeting the requirements specified in subsection (f). (Authorized by and implementing K.S.A. 2019 Supp. 32-807.)

Based on the data available, approximately 71% of historical whooping crane reports in Kansas occurred prior to November 4. Two important areas for the whooping crane, Cheyenne Bottoms Wildlife Area and Quivira NWR, have protective restrictions in place. Quivira NWR is closed to crane hunting and other hunting when the whooping cranes are on the Refuge (USFWS 2021d). If whooping cranes are reported at Cheyenne Bottoms Wildlife Area, the pool they are using is closed to all activities and the area also will be closed to light goose and sandhill crane hunting (Kansas Department of Wildlife and Parks n.d.).

Since the initiation of sandhill crane hunting in Texas during the early 1960s, an effort was made to provide temporal and spatial separation between sandhill crane hunters and whooping cranes (Thompson and George 1987). The first of ultimately three sandhill crane hunting zones, designated as Zone A, permitted sandhill crane hunting in the Trans-Pecos and Western Panhandle regions of Texas starting in 1961, well to the west of known whooping crane migration routes. Zone B opened the eastern Panhandle in 1968, overlapped suspected whooping crane migration routes and was consequently restricted from opening until around December 1 to allow completion of the mid-October to mid- November whooping crane migration. Zone C, a limited season and area in south Texas, was implemented in 1983 and

was designed to open after all whooping cranes had reached the Texas Coast in the fall and terminate before the whooping cranes began their return migration in the spring (Thompson and George 1987).

5.1.3 WHOOPING CRANE CONTINGENCY PLAN

Another protective program for the whooping crane involves thirteen States that cooperate with the Service in the Contingency Plan for Federal-State Cooperative Protection of Whooping Cranes (Whooping Crane Committee 2006). Protection of whooping cranes is increased through implementation of the Contingency Plan. The Contingency Plan provides a mechanism for designating appropriate response options and reporting requirements whenever whooping cranes are confirmed as sick, injured, or dead, or when they are healthy but in a situation where they face hazards, such as shooting/hunting activities or contaminants and disease. Furthermore, Plan objectives include reducing the likelihood of illegal shooting of whooping cranes by non-sportsmen or vandals, and increasing the opportunity to recover and rehabilitate wild whooping cranes found injured or sick.

The Plan outlines cooperative Federal-State efforts to protect migratory whooping cranes in the Central Flyway but does not cover whooping cranes listed as non-essential experimental. The plan outlines responses to a number of hazards potentially faced by whooping cranes such as disease, powerlines, contaminants, and hunting. Films, posters, brochures, informational website, and other conservation education materials are provided to the public as part of the contingency plan. The primary emphasis of this plan is to list the response options when cranes are observed in hazardous situations or when cranes are found injured, sick, or dead. Two Federal and two State personnel are responsible for implementing the plan in each State. If whooping cranes are reported in an area open to hunting, State and/or Federal personnel check the sighting report. When whooping cranes are confirmed in an active hunting area situation, the personnel decide if the activity of the bird(s) should be monitored and a several square-mile area may be closed to hunting (spot- closure) until the whooping crane(s) leaves the area.

The Contingency Plan, first implemented in 1985, was significantly updated in March 2006. Implemented by Provincial, State and Federal agencies, the Plan is believed to have led to an increase in reported sightings and reduced losses to shooting and disease (Lewis 1992). However, the Plan has major limitations, and implementation is an unfunded program (Stehn 2005). Further, it is unknown where and when whooping cranes may choose to stop during migration. In general, the Contingency Plan has less stringent measures for handling a scenario when a few cranes stop in a location only occasionally frequented by whooping cranes. When regular usage by a large number of whooping cranes occurs in a known location, the more protective measures in the Contingency Plan are called for (Stehn 2005).

5.1.4 MORTALITY

The historical number of whooping cranes killed by hunters has been reported in Kraft and Hands (2005). Since 1967, 34 whooping cranes have been shot, the majority taking place in the reintroduced populations (International Crane Foundation 2022d). Because of the nature of these crimes, reducing the mortality due to this cause is problematic. For birds shot either by vandals or in cases still under investigation, most (74%) have been determined to not be associated within legal hunting seasons. In the few cases that involved hunters, the hunters were already in violation of a hunting regulation, such as shooting before legal hunting hours, when poor lighting makes identification difficult. The most recent shooting occurred in Oklahoma in late 2021 when four whooping cranes were killed, the most in any other single incident

(International Crane Foundation 2022d).

Among 68 Whooping Cranes marked with transmitters, Pearse et al. (2019) confirmed deaths of 17 by recovering remains between 12 June 2011 and 30 March 2015 using location information provided by satellite transmitters. At death, three birds were adults, seven sub-adults, four fledged juveniles, and two pre-fledged juveniles. Mortalities occurred in all seasons and over a wide period within summer and winter. Mortality during winter accounted for 44% of annual mortality; 42% of deaths occurred during summer, and 14% during migrations. Predation and disease were known causes of mortality for Whooping Cranes in the study conducted by Pearse et al. (2019).

While mortality of whooping cranes has occurred as result of hunting, regulatory mechanisms have been developed to minimize death or injury to the whooping crane. The sandhill crane hunting restrictions, devised to protect whooping cranes, were implemented because of the similarity in appearance between the two crane species. Specific restrictions for the State of Kansas were implemented to avoid the accidental shooting of whooping cranes. In addition, the Whooping Crane Contingency Plan reduces the likelihood of several threats to the species.

Nonetheless, the information provided above suggests that there is reason to expect an occasional incidental mortality caused by a migratory bird hunter. The Service anticipates that one whooping crane per year may be accidentally killed or injured by migratory bird hunters. This estimate is based on the historical numbers killed or injured over the same timeframe, the protective measures that minimize risk of death or injury to whooping cranes, and the small likelihood of hunters misidentifying whooping cranes.

5.1.5 CRITICAL HABITAT

There are five areas of critical habitat designated for the whooping crane, located in Kansas, Nebraska, Oklahoma, and Texas, primarily on Federal and State wildlife management lands. These areas provide roosting, resting, and foraging habitat for the cranes as they migrate between their breeding and wintering grounds. Hunting activities within the Cheyenne Bottoms State Wildlife Management area designated as critical habitat are substantially regulated. Many NWRs designated as critical habitat require a reservation to gain access. Access is primarily on foot and not expected to result in destruction or adverse modification of the critical habitat. Critical habitat on the wintering grounds in Texas as currently designated is not large enough to support abundances that would permit down-listing of the species (Stehn and Prieto 2010). The need for expanding critical habitat is being discussed.

5.2 STELLER'S EIDER

The following section discusses the possible effects of the Action on listed species. This discussion includes, where appropriate, quantitative information from harvest survey reports, published literature, agency reports, and qualitative information from Traditional Ecological Knowledge (TEK), anecdotal observations, results of recent or ongoing research on the species, the Intra-agency Conference for Proposed 2010 Alaska Migratory Bird Spring/Summer Subsistence Hunt (USFWS 2010), and best professional judgment regarding the species' availability and vulnerability to harvest.

Harvest survey reports used in this evaluation are derived primarily from three sources:

1) 1965–2006 bird harvest data for western and northern Alaska were summarized in Huntington (2009). This summary included surveys conducted in selected villages and

years by a range of organizations, annual harvest monitoring from 1985–2002 on the Y-K Delta, and semi-annual harvest monitoring from 1995– 2002 in the Bristol Bay region conducted in the context of the Goose Management Plan (Appendix 1).

2) A report summarizing subsistence harvest surveys sponsored by the North Slope Borough for 1994–2003 (Bacon et al. 2011; Appendix 2).

3) 2004–2020 bird and egg harvest data produced by the annual harvest monitoring program of the AMBCC (Naves et al. 2021). This program was created to implement provisions of the Migratory Bird Treaty Act Amendment, which allowed legal spring-summer subsistence harvest of migratory birds in Alaska. Data has been reported by management regions (further divided in sub- regions) and harvest seasons (spring, summer, and fall). These data were not included in Huntington (2009).

In using harvest survey reports to evaluate harvest, it is important to consider that their reliability is affected by a number of unquantifiable biases. Identified biases include sampling flaws or measurement error such as targeting unrepresentative households or villages, inaccurate recall by survey respondents, reluctance to report illegally-taken species, mischaracterization of fishing by-catch as hunting harvest, lack of detection of unrecovered killed or crippled birds, and errors in data collection (Huntington 2009, Omelak et al. 2009, USFWS 2010). Additionally, for rare species, survey coverage may not be adequate to detect harvest since it occurs at low levels, particularly in large villages. Each of these biases has likely affected the accuracy of survey data, but the direction and magnitude of each, and how they cumulatively affect the estimates, remains unknown. Additionally, coverage has varied among years, and methods and sampling designs have evolved over time, compromising comparison among years or over other intervals (Wentworth 2004). Further, the available harvest survey data contain considerable evidence of misidentification among species. Although we find numerous examples where other species appear to have been incorrectly reported as listed or candidate species (“false positives”), it follows that systemic confusion over identification among closely-related or similar species will also have resulted in “false negatives” where listed or candidate species have been incorrectly reported as other species. How these negative and positive biases balance out cannot be determined from the available information. The evidence of biases including misidentification and their possible influence on the reliability of harvest estimates is discussed below, on a species- specific basis.

This Biological Opinion exclusively pertains to the fall hunting season. It is important to note that in assessing the effects of this action, we also included the effects of subsistence harvest in the spring and summer seasons. Waterfowl hunting in Alaska is defined by the Service as two separate hunting periods, governed by different regulations in April – August and in September – February. Several methodological reasons make it difficult to divide the available harvest survey data separately into these two distinct categories. First, survey methods have changed over time; in early surveys, eider harvest was not separated by time period. Second, harvest surveys are generally (but not always) conducted after the end of the fall hunt, when hunters are asked to recall the number of birds shot before August 31, and the number shot afterward. As most subsistence hunters probably do not see the August 31 date as particularly noteworthy and significant time has passed between the early spring hunt and the day the survey takes place, it is reasonable to assume that assigning harvest accurately to two different time periods would be difficult. Additionally, for yellow- billed loons we considered the effects of inadvertent by-catch in subsistence fishing nets.

The spring-summer Subsistence hunt will be considered in a separate Biological Opinion

developed by the Service's Fairbanks, Alaska Office. However, because of the difficulty with splitting the subsistence harvest data into two different time periods, we will consider the total annual harvest in this effects analysis. This is a more conservative approach that will allow us to ensure we are considering the total effect of the fall hunt. Further, we reason that precise allocation of impacts to the correct subsistence-related increment is essential only in the event that our final conclusion were to jeopardize the continued existence of listed and candidate species. If our final conclusion, after summing all identified increments of impact, is non-jeopardy, it follows that each subset of this total i.e., both the spring/summer subsistence and fall hunts is also non-jeopardy.

5.2.1 ANNUAL MIGRATORY GAME BIRD HUNTING SEASON (SPORT OR FALL HUNTING SEASON)

We conclude take of Steller's and Spectacled eiders during the sport hunting season (fall and winter) occurs because hunters are unaware of prohibitions against shooting Steller's and Spectacled eiders or are unable to identify Steller's and Spectacled eiders on the wing prior to shooting. Although such take has been documented, no harvest monitoring mechanism adequately measures take of listed eiders by migratory game bird hunters. Current harvest monitoring mechanisms include the Harvest Information Program (HIP) and the Parts Collection Survey, both cooperative efforts of the Service and Alaska Department of Fish and Game (ADF&G). The Harvest Information Program (administered by the Service) asks a sample of state-licensed migratory game bird hunters to report their harvest of birds in general categories such as ducks, geese, and sea ducks. Also administered by the Service, the Parts Collection Survey, a sample of successful hunters from previous seasons, estimates the age, sex, and species composition of the harvest based on returned wings and tail feathers. Together, these surveys are used to develop species-specific state- level and national harvest estimates. However, these methods are inadequate tools for effectively monitoring harvest levels of rare or rarely harvested species like listed eiders, which would seldom be picked up in the random sample. In addition, the distribution of sport hunting pressure within the range of listed eiders during fall and winter remains unclear. Finally, it is uncertain what proportion of subsistence hunters' purchases Fall/Winter waterfowl hunting licenses, which they must do to fall within the sample universe of the HIP or the Parts Collection Survey.

The proposed action would regulate hunting in areas occupied by Steller's and Spectacled eiders. In 2003 and 2004, we concluded that the proposed action would be likely to adversely affect the listed population of Steller's eiders. OLE efforts determined that, in 2002–03, at least 12 male and 12 female Steller's eiders (both listed and non-listed entities) were killed by sport hunters on Kodiak Island. In 2003–04, Service OLE efforts identified a take of 2 Steller's eiders (both listed and non-listed entities). Because the HIP and Parts Collection Survey probably do not adequately sample take in these remote areas, there is almost certainly additional unreported take of Steller's eiders (possibly both listed and non-listed entities) by hunters beyond that reported by OLE agents.

Pursuant to the terms and conditions starting with the 2004–05 Biological Opinion, educational and OLE efforts were implemented to reduce the likelihood of take of listed eiders during the sport hunting seasons. Though we do not have final figures, preliminary information on the results of these efforts indicates that we were successful in significantly reducing incidental take of listed eiders during the fall hunting seasons. No citations for illegal shooting of listed eiders by hunters were issued since the 2008–09 fall/winter hunting seasons.

Assuming that progress continues in addressing the terms and conditions set forth in the 2004–

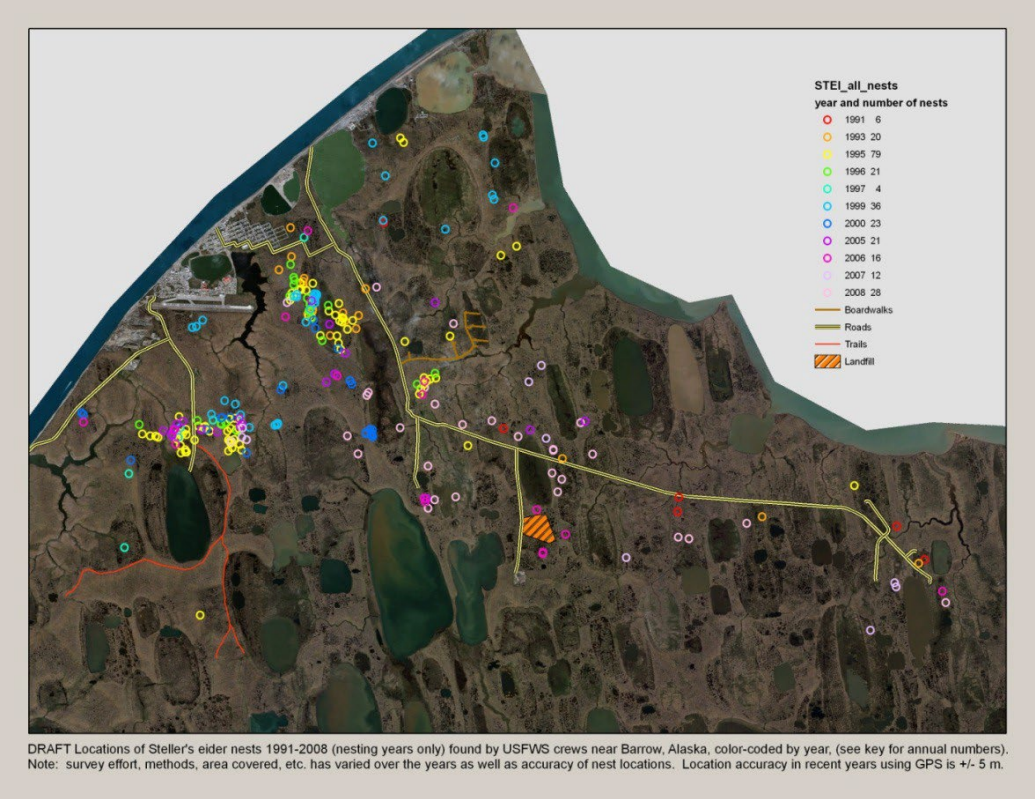
05 Biological Opinion and the harvest estimates from the 2009-2013 Biological Opinion on Subsistence Hunting are conservative, we conclude it is reasonable to assume that take of Steller's eiders (both listed and non-listed entities) and Spectacled eiders (listed) is likely to decline over time. Based on these assumptions, we expect that approximately 24 Steller's eiders (both listed and non-listed entities) are inadvertently shot during the sport hunting season; however, given the listed Alaska-breeding population is only a small proportion of the Pacific-wintering population of Steller's eiders, approximately 0.7%, available to fall/winter hunters, we expect less than one listed individual will be taken annually. We also conclude that a very small number (>20 Spectacled eiders) of the listed population are inadvertently shot during the sport hunting season.

5.2.2 VULNERABILITY OF STELLER'S EIDERS TO SUBSISTENCE HARVEST

The vulnerability of Steller's eiders to subsistence harvest varies according to location, year, and time of year. Steller's eiders are thought to migrate northward from the Bering Sea to the North Slope as leads of open water develop in the Bering and Chukchi sea pack ice.
North Slope hunters anecdotally report that during migration, Steller's eiders may fly in single or mixed-species flocks, and are difficult to distinguish from other eiders that are legally hunted during this time. The early subsistence harvest (April and May) of migratory birds typically commences from the coast or shorefast ice, and in some cases, in conjunction with the subsistence harvest for whales. Therefore, hunters along the western coast of Alaska may encounter Steller's eiders during spring migration, and they may be harvested during hunting focusing primarily on other species.

Steller's eiders arrive on the North Slope, including Utqiaġvik, from late May to early June. A large portion of Alaska-breeding Steller's eiders remain near Utqiaġvik, and can be observed from the road system for several weeks in non-breeding years, and several months in breeding years (Figure 15. Because ducks and geese are regularly hunted from this road system (USFWS, unpublished observations), Steller's eiders are at risk from shooting during the breeding season near Utqiaġvik.

Figure 13.Steller's Eider Nests Found During Studies Near Utqiaġvik, 1991-2008 (Quakenbush et al. 1998, Rojek 2008).



DRAFT Locations of Steller's eider nests 1991-2008 (nesting years only) found by USFWS crews near Barrow, Alaska, color-coded by year, (see key for annual numbers). Note: survey effort, methods, area covered, etc. has varied over the years as well as accuracy of nest locations. Location accuracy in recent years using GPS is +/- 5 m.

In non-breeding years both male and female Steller's eiders return to the ocean by mid-summer, where they may be vulnerable to subsistence hunting from boats. In mid-August through September, successfully breeding females and their ducklings are vulnerable as they stage and forage in waterbodies near Barrow Duck Camp before commencing their southward migration (USFWS, unpublished data).

There is limited information available on the movements of non-breeding and post-breeding Steller's eiders, particularly on the North Slope. However, birds radio-tracked near Utqiaġvik moved along the Chukchi Sea coast from Utqiaġvik to Pt. Hope, near the Seward Peninsula, and in southern Norton Sound (USFWS, unpublished data); therefore, it is reasonable to assume that Alaska-breeding Steller's eiders may be vulnerable along the coast where hunting occurs during fall migration.

Because the majority of Steller's eiders are thought to molt and winter in nearshore waters in southwest Alaska, sometimes near known hunting areas, they may be at risk to harvest. However, in southwest Alaska, Alaska-breeding Steller's eiders are mixed with the larger Russia-breeding population which also molts and winters in southwest Alaska, so presumably only a very small proportion of Steller's eiders taken in this region are from the Alaska-breeding population.

Therefore, the Service concludes Alaska-breeding Steller's eiders may be shot during the spring-summer subsistence hunt and early in the fall hunt: 1) during northward, spring migration; 2) while on their breeding grounds on the North Slope, especially near Utqiaġvik ; 3) during

post-breeding movements and migration; and 4) to a much lesser extent, throughout their traditional molting and wintering range. Steller's eiders appear to be at particular risk near Utqiaġvik during the spring, summer, and fall because of their concentrated use of the Utqiaġvik area, use of habitats near the road system at Utqiaġvik, and repeated flights near Barrow Duck Camp.

5.2.3 HARVEST SURVEY DATA

Huntington (2009) summarized harvest survey data from several sources, but spatial and temporal coverage is incomplete and varies annually. Methods also varied; for example, in some years eiders were not identified to species, but grouped as "eiders." Harvest was reported in some villages in the North Slope, Northwest Arctic, Bering Strait-Norton Sound, Bristol Bay, and Y-K Delta regions. Many villages in most years reported zero take of Steller's eiders. When take was reported, estimates ranged from to 2 to 160 Steller's eiders harvested in each village annually. The most comprehensive survey included five villages on the North Slope in 1992, which estimated Steller's eider harvest of 321 in that year (Fuller and George 1997, and summarized by Huntington 2009), although the authors suggested that some of these birds were misidentified and may have been king or common eiders. We also question the reliability of this estimate, as harvest of over 300 from a small population would be reflected in a severe decline that would be observable from Service monitoring efforts. Additionally, such a large harvest of a species that occurs in small numbers on the North Slope would be difficult to accomplish. In the Northwest Arctic region, the only indicated listed eider harvest from various years between 1972 and 2007 indicated 115 Steller's eiders shot in the village of Kotzebue in 1997. Other regional annual harvest summarized in Huntington (2009) ranges from 0 to 60 for Bering Strait – Norton Sound, 0 to 90 for the Y-K Delta, and 4 to 90 in the Bristol Bay region.

Bacon (2011) is another source of harvest information for villages on the North Slope from 1994-2003. Harvest is identified to species level in some years and villages but grouped as "eider species" and not separated into species in other instances. Of particular note is an estimate of 43 Steller's eiders harvested in Wainwright in 2003 (based on reported harvest of 38 Steller's eiders). Aerial survey data and information from village residents indicate that Steller's eiders are very rare near Wainwright during the breeding season. Thus, it is reasonable to assume that if Steller's eiders are harvested at Wainwright, they are most likely taken during spring or fall migration, as Steller's eiders migrate along coastlines (and thus past coastal villages) in spring as leads open and in fall en route to molting areas. Because this estimate is only from a single year, we do not assume that it is representative of normal or average harvest rates, and it may in fact be either anomalous or erroneous (possibly because of misidentification), but we cannot determine its credibility with the available information.

Harvest of Steller's eiders was reported by AMBCC in five regions: North Slope, Bristol Bay, Y-K Delta, Bering Strait/Norton Sound, and Aleutian-Pribilof Islands (Naves et al. 2021). AMBCC estimates of harvest in the North Slope region, where the Alaska population breeds, range from 0 to 36 birds during the spring/summer subsistence hunt. The North Slope was not sampled in 2010 or during the fall hunt period of 2004-2009, although Steller's and spectacled eiders are still available for harvest on the North Slope during this time, as breeding females and fledged young depart the breeding grounds in mid-August to mid-September (USFWS, unpublished data and observations). Therefore, these AMBCC estimates of 0 to 36 do not include potential fall harvest and thus may be biased low.

AMBCC reports annual harvest estimates of Steller's eiders ranging from 0 to 83 in Bristol Bay, 0 to 135 in the Y-K Delta, and 0 to 121 in the Bering Strait/Norton Sound, and 0 to 12 in the

Aleutian-Pribilof Islands region (Naves et al. 2021). We conclude that listed, Alaska-breeding Steller's eiders comprise a very small proportion of those Steller's eiders occurring in the Bristol Bay and the Y-K Delta regions, so risk to the listed population of harvest in these regions is proportionately very low. (The proportion of listed Steller's eiders within the total Steller's eider population in these regions likely roughly approximates the proportion in southwest Alaska wintering areas, which is generally thought to be < 1%; see Status of the Species above). In contrast, harvest of Steller's eiders in the Bering Strait/Norton Sound region may include a larger proportion of Alaska-breeding Steller's eiders, depending on where within this region the harvest takes place. Available satellite telemetry data provide no evidence that Russia-breeding Steller's eiders regularly move along the Seward Peninsula or through Norton Sound en route to or from Russia. Thus, harvest along the Seward Peninsula or in Norton Sound may include members of the listed population, possibly even a high proportion, depending on the frequency at which Russia-breeding individuals pass through these sub-regions.

From all sources, Steller's eider harvest survey data exhibit high inter-annual variation, which could reflect high sampling error or actual high inter-annual variation in harvest rates. The fact that Steller's eiders only breed intermittently and have decidedly different patterns of occurrence on the North Slope in breeding and non-breeding years, provides a biological basis for inter-annual variation, but it is unknown how much this contributes to variation in harvest estimates. Regardless, high inter-annual variation in harvest estimates makes it difficult to reliably estimate average annual harvest rates or predict harvest in advance for a specific year.

Reported Steller's eider harvest estimates also indicate chronic and numerically significant misidentification error which undermines the credibility of the harvest estimates. Older harvest surveys summarized by Huntington (2009) include an estimate of Steller's eider harvest for the North Slope of 321, which are highly unlikely for the reasons stated above. More recent and locally-designed estimates by the North Slope Borough (Bacon et al. 2011) include an estimate of 43 Steller's eiders for Wainwright in a single year, which although possible, is probably not representative of average harvest levels from this village. Finally, the AMBCC report (Naves et al. 2021) estimates Steller's eider egg harvest of 40 to 191 eggs in four years in the Bering Straits/Norton Sound region (egg harvest is discussed further in Loss of Eggs/Chicks), although it is unlikely that Steller's eiders nest in this region, and therefore, highly unlikely that they nest there in numbers required to support this level of egg harvest. The last recorded nest in the region was on St. Lawrence Island over 50 years ago (Fay and Cade 1959), and the last recorded nest from the Seward Peninsula was in the 19th century (Portenko 1989). Because confusion among eider species apparently accounts for many reports of Steller's eider harvest, it must be assumed that some harvested Steller's eiders may be misidentified and reported as other species.

It appears that Steller's eider harvest estimates are plagued by significant unquantifiable biases, and none of the three general sources of information appear to be immune or provide a means of estimating harvest that is decidedly more reliable. Even though the harvest survey data have many notable shortcomings, it is the best information available, and it influences our analysis when estimating the amount of harvest. To imply an appropriate level of confidence in the data, we considered the range of values given from harvest surveys in a general sense by considering the estimates as orders of magnitude instead of precise numbers (for example, "tens" rather than "23"). We conclude that while these data do not allow for a precise estimate of harvest with a reasonable degree of reliability, it is probably reasonable to assume, based on the range of estimates reported in areas where Alaska-breeding Steller's eiders are vulnerable to harvest, that roughly tens of Alaska-breeding Steller's eiders may be harvested during subsistence hunting in spring, summer, and fall in many years, with actual harvest rates in

individual years likely varying with breeding conditions on the North Slope.

5.2.4 OTHER AVAILABLE INFORMATION REGARDING HARVEST

Discussion with hunters on the North Slope and direct observations confirm that some Steller's eiders are taken during the subsistence hunt. North Slope hunters indicate that Steller's eiders often fly in mixed flocks with king and common eiders, are hard to identify, and on occasion, are inadvertently shot. Specifically, hunters report that Steller's eiders staging in waterbodies near Duck Camp may join migrating king and common eider flocks and are subject to shooting. Direct observations by the Service's OLE officers and biologists in Utqiaġvik have documented shot Steller's eiders along the roads and in hunters' possession. Between 1993 and 2010, 29 shot Steller's eiders were detected at Utqiaġvik ; 21 of these were shot in 2008 (16 were found at Duck Camp, 5 along roadsides). The year 2008 was considered a highly successful breeding year for Steller's eiders (USFWS, unpublished data). These observations suggest that Steller's eiders are highly vulnerable to shooting mortality in breeding years, and during these years, spring and summer subsistence harvest may result in roughly tens of Steller's eiders shot in the Utqiaġvik area alone, which is consistent with our conjecture based on harvest survey data.

In summary, our ability to enumerate Steller's eider harvest from harvest survey reports is limited by the unquantifiable bias associated with the harvest estimates. However, these data, coupled with information on Steller's eider availability, direct observations, and observations from local residents, suggest that roughly tens of Steller's eiders may have been harvested annually during the spring and summer subsistence hunting, but the harvest rate likely varied annually with the breeding status of Steller's eiders on the North Slope. Although we cannot quantify harvest, we are certain that Steller's eider mortality has occurred in past years, specifically during the spring-summer subsistence hunt, and we cannot precisely predict future mortality risk; therefore, a conservation program to eliminate or reduce the risk of mortality during the spring-summer subsistence hunt began in 2009, as described below.

5.2.5 CONSERVATION MEASURES TO REDUCE RISK OF HARVEST

In response to indications that Steller's eiders have been shot during the spring-summer subsistence hunt in recent years, particularly 2008, the Service has developed and implemented a species-specific conservation program intended to reduce the risk. This program currently focuses on the North Slope, especially Utqiaġvik , where the species' propensity to nest, combined with observations described in Other Available Information Regarding Harvest, indicate risk is likely the greatest. This spring-summer subsistence hunt program consists of 3 major components:

Regulations for the subsistence hunt which include the expressed intent to check hunters to verify compliance with prohibitions against closed species (which include spectacled and Steller's eiders) and the expressed capability for the Service's Alaska Regional Director to prescribe emergency regulations necessary in the event that substantial harvest of Steller's eiders is indicated, ranging from temporary closure of duck hunting in a small geographic area to large-scale regional or State-wide long-term closures of all subsistence migratory bird hunting;

The presence of Service OLE agents during the subsistence harvest on the North Slope, commensurate with the need, aimed at: a) enforcing regulations; b) engaging in outreach and education efforts with hunters; and c) verifying compliance with prohibitions against taking Steller's eiders, to ensure a timely and appropriate response in the event that mortality of

Steller's eiders takes place; and

A long-term outreach and education effort developed and implemented collaboratively with hunters and residents of the North Slope, to seek support for Steller's eider conservation efforts.

The regulations, implemented in accordance with the Conservation Measures, are considered the principal way in which threatened eider shooting mortality will be substantially reduced or eliminated. The authority to prescribe emergency regulations provides an additional level of assurance that, if an unexpected amount of Steller's eider shooting mortality occurs, it will be curtailed to avoid approaching jeopardy to the existence of the species.

5.2.6 SUMMARY

In summary, we conclude that we cannot reliably characterize previous Steller's eider harvest levels in Alaska. Our ability to assess impacts is further compromised by difficulty in appropriately allocating harvest in some portions of Alaska to listed and unlisted populations. It is possible that no Steller's eiders are harvested in non-breeding years because of their short tenure in breeding areas and resulting lack of availability to hunters. However, we expect that in a breeding year, some Steller's eiders could be taken (possibly in the order of tens) during the spring and summer subsistence harvest, particularly on the North Slope where the majority of the listed taxon breeds, but the conservation measures described above reduce that risk.

Additionally, the Service in collaboration with North Slope partners will routinely monitor and verify that listed eiders are not being shot and will evaluate the effectiveness of our education, communication, and outreach efforts. If mortality is detected, the Service will reassess current outreach and education strategies, determine where changes are needed, and heighten targeted outreach and targeted OLE efforts commensurate with the risk. If it cannot be reasonably assumed that the factors leading to shooting of Steller's eiders have been identified and adequately ameliorated, the Service Regional Director may institute emergency regulations in consultation with AMBCC during the spring and summer subsistence harvest until impacts can be revaluated and minimized.

5.3 SPECTACLED EIDERS

5.3.1 VULNERABILITY OF SPECTACLED EIDERS TO HARVEST

Like Steller's eiders, spectacled eiders are at risk to shooting during the subsistence harvest during their spring and fall migrations along the western coast and North Slope of Alaska. Because they often fly in mixed-species flocks, and are similar size to common and king eiders, spectacled eiders can be difficult to distinguish from other eiders that can be legally hunted; thus, they are subject to misidentification and inadvertent harvest during migration. They may also be taken by hunters that are unaware of that fact that spectacled eiders cannot be legally hunted, and by hunters not inclined to comply with species-specific closures.

Spectacled eiders breed on the Y-K Delta and the North Slope of Alaska, where nests are broadly dispersed. Breeding spectacled eiders are not found in unusually large concentrations near villages or areas of high human activity, and their dispersed nesting distribution probably prevents a large proportion of the nesting population from being subject to possible harvest.

Although data are lacking, molting spectacled eiders may be at risk from shooting during the spring-summer Subsistence hunt. Spectacled eiders molting in Ledyard Bay and Norton Sound may be shot during other legal subsistence activities (e.g., marine mammal hunting by boat) in

July and August. However, during winter, most spectacled eiders occur in ice leads and polynyas south of St. Lawrence Island, where they are likely inaccessible to hunters.

Based on limited information, we expect that spectacled eiders are at greatest risk from shooting during the subsistence harvest on their spring and fall migrations, and to a lesser degree on their breeding and molting areas.

5.3.2 HARVEST SURVEY DATA

Huntington (2009) summarizes harvest survey data from several sources from various years between 1972 and 2007, but spatial coverage is incomplete and varies annually. The only year that has significant survey coverage on the North Slope (five villages) is 1992, with reported harvest of 995 spectacled eiders. Fuller and George (1997) suggested that some of these birds were misidentified and may have been king or common eiders. In the Northwest Arctic region spectacled eider harvest was not identified specifically in the data; however, total reported eider harvest in this region ranged from 0 to 196 annually, and may have included common, king, spectacled, and Steller's eiders. In the Bering Strait – Norton Sound region, annual reported harvest ranged from 0 – 517 spectacled eiders. The Y-K Delta region has the most complete historical data set of harvest, since Alaska Department of Fish and Game conducted annual subsistence surveys in the region from 1985 to 2005 (except 1988 and 2003), with reported annual harvest of spectacled eiders ranging from 20 (2005) to 305 (1986). Reported annual harvest of spectacled eiders in the Bristol Bay region ranges from 0 to 156. Not all regions and sub-regions, or all years, are represented in this data; in addition, methodology varied. Therefore, using the data to make predictions of future harvest is not possible.

Bacon et al. (2011) is another source of harvest data for villages on the North Slope from 1994-2003. Of particular interest are the harvest estimates of 253 spectacled eiders from Wainwright in May and June 2003. As with Steller's eiders, these data support the supposition that spectacled eiders are susceptible to harvest on migration, but this single report cannot be assumed to be representative of normal harvest levels.

Harvest of spectacled eiders during the 2004 – 2020 spring-summer Subsistence hunt was reported by AMBCC in four regions: North Slope, Bristol Bay, Y-K Delta, and Bering Strait – Norton Sound. Estimates of annual harvest in the North Slope and Y-K Delta regions, where spectacled eiders nest, range from 9 to 1,324 and 8 to 225, respectively (Naves et al. 2021). Harvest estimates ranged from 0 to 131 in the Bristol Bay region and 6 to 1,085 in the Bering Strait – Norton Sound region (Naves et al. 2021).

As with Steller's eiders, spectacled eider harvest data may be plagued by misidentification among eider species. If Steller's eiders, which are significantly smaller in size and have behaviors that distinguish them from other species, are misidentified as other eiders, it follows that spectacled eiders would be even more likely to be misidentified, because they are closer in size to common and king eiders and also fly in mixed flocks.

While the variability and accuracy of harvest estimates may be affected by misidentification, reports of spectacled eider harvest in the four regions are consistent with spectacled eider distribution and thus do not indicate any misidentification bias based on likelihood of occurrence in a particular area. It is plausible that spectacled eiders are harvested in their two primary nesting areas in Alaska, the North Slope and Y-K Delta. As they winter and migrate through the Bering Strait – Norton Sound region, it is also reasonable to assume that spectacled eiders may be harvested there. Little is known about the presence of spectacled eiders in the Bristol Bay

region; in fact, this area is not within the documented range of the species in published reports (Peterson et al., 2000). However, due to Bristol Bay's proximity to the Y-K Delta breeding grounds, it is possible that non-breeding, failed- breeding, or post-breeding individuals may temporarily occupy Bristol Bay, providing possible legitimacy to these reports of harvested birds (B. McCaffery,Y-K Delta NWR, pers. comm.).

5.3.3 OTHER AVAILABLE INFORMATION REGARDING HARVEST

Discussion with North Slope hunters and observations of Service employees confirm that some spectacled eiders are taken during the spring-summer Subsistence hunt. North Slope hunters report that spectacled eiders often fly in mixed flocks with king and common eiders and are inadvertently shot on occasion. Service biologists and enforcement agents in Utqiaġvik have documented shot spectacled eiders along the roads, in hunters' possession, and hanging from racks.

5.3.4 SUMMARY

While the accuracy of harvest estimates may be affected by misidentification, reports of spectacled eider harvest in the four regions are generally consistent with known or feasible spectacled eider distribution and thus do not indicate obvious errors based on likelihood of occurrence. Several factors could bias estimates high, but it is possible that some also bias estimates low. As identified above with Steller's eiders, these biases cannot be quantified or cumulatively assessed, which seriously constrains the precision with which we can estimate harvest; however, these data, combined with information on spectacled eider availability, direct observations, and information from local residents, suggest that roughly tens to hundreds of spectacled eiders are likely harvested each year especially during the spring and summer subsistence hunt, but more precise estimates are not possible with the available information.

5.4 STELLER'S and SPECTACLED EIDERS

5.4.1 LOSS OF EGGS/CHICKS

Although the Action does not include the breeding season, the spring-summer subsistence harvest seasons coincide with sensitive periods such as egg laying, incubation, and brood rearing, for both listed eider species. The Service, therefore, includes an analysis of the overall effects of the combined actions.

Egg harvesters target goose nests, and especially those of colonially nesting species of geese. While it is true that eiders sometimes nest near and among colonially nesting geese, we do not conclude the nests of tundra-nesting eiders, such as Steller's and spectacled eiders, are typically targeted by egg collectors because they tend to nest at lower density and their nests are very cryptic. Yet, listed eiders and their nest contents could be collected or disturbed by serendipitous discovery.

Egg collection is probably reduced to some extent by subsistence harvest closures designed to protect nests and broods during the middle of the nesting season. On the North Slope, the regulations include a 30-day closure June 15 – July 15; on the Y-K Delta, the dates of the 30-day closure vary annually with current year nesting phenology; announcements of those dates are broadcast over local public radio stations. (AMBCC 2022). The closure is likely most effective near Utqiaġvik, where increased outreach and LE efforts have been successful at announcing and enforcing the closure, particularly since 2008. The closure does not encompass the entirety of the listed eider nesting season, and it is possible that some illegal egg collection

of other species occurs during the closure, so some harvest of listed eider eggs may occur.

Limited egg-gathering data presented by Trost and Drut (2001, 2002) suggest that collection of Steller's or spectacled eider eggs is low, with an average of seven spectacled eider eggs and one Steller's eider egg taken annually between 1992 and 2001. The 2001 Pacific Flyway Data Book (Trost and Drut 2001) reported annual average egg harvest for the years 1995, 1997, and 1999 ranges between 4 and 84 for spectacled eiders and up to 1 for Steller's eiders in the Bristol Bay region. Because the Bristol Bay region is well outside the breeding range of Steller's and spectacled eiders, the reported harvest from that region calls the reliability of these data into question.

More recently, AMBCC spring and summer subsistence harvest surveys have reported take of Steller's eider eggs in two regions during 2004-2020 (Naves et al. 2021). The Y-K Delta region reported 12 Steller's eider eggs in 2007 and 66 in 2009. Steller's eider egg harvest was reported in the Bering Strait-Norton Sound region in 5 of 11 years it was surveyed by AMBCC, with harvest estimates ranging from 0 to 191 annually. The same two regions reported take of spectacled eider eggs, along with the North Slope region. The only report of spectacled eider egg harvest on the Y-K Delta was from the mid coast sub-region in 2008, with an estimate of 109 eggs harvested. In the Bering Strait/Norton Sound region spectacled eider egg harvest was reported in 4 of 11 years surveyed, with estimates of 23 in 2004, 48 in 2005, 49 in 2010, and 306 in 2017. In the North Slope region 136 eggs were reported harvested in 2018 (Naves et al. 2021).

Like the harvest survey data, egg collection data reported in harvest surveys are subject to potential bias, and several examples of misidentification are apparent based on species distribution information, so caution must be used in interpreting results. For example, Fay and Cade (1959) reported nesting Steller's eiders on St. Lawrence Island as recently as the 1950s, but no data currently suggests that a breeding population of Steller's eiders or spectacled eiders in the Bering Strait/Norton Sound region exists. Likewise, the number of Steller's eiders nesting on the Y-K Delta is extremely small and probably non-existent in some years (Flint and Herzog. 1999.). Therefore, data suggesting Steller's eider egg collection in the Bering Strait/Norton Sound region are probably erroneous, and Steller's eider egg collection reports from the Y-K Delta are either anomalous or erroneous.

Spectacled eiders nest in significant numbers on the Y-K Delta (see Status of the Species), therefore take of eggs in this region is possible. However, previously reported numbers (Naves 2009) are probably small because spectacled eider nests are normally sparsely distributed as compared to targeted species such as geese, and the closure of harvest during the middle of the nesting period probably discourages egg collection.

Therefore, given that: 1) spring and summer subsistence hunting and egg collection are closed during the egg-laying and incubation stages of Steller's and spectacled eiders on their primary nesting areas of the North Slope and Y-K Delta; 2) egg collectors tend to target other species; and, 3) although biased by some unknown amount, harvest surveys suggest that low numbers of listed eider eggs are collected; we estimate that the proposed spring and summer subsistence regulations will result in low tens of spectacled eider eggs, and no Steller's eider eggs, collected annually throughout Alaska.

5.4.2 LEAD CONTAMINATION

Spring subsistence hunting may result in the deposition of lead shot into freshwater

environments, especially near villages on the Y-K Delta and the North Slope. Ingestion of lead shot by listed eiders could occur during the breeding season, particularly for breeding hens and young birds that forage in shallow tundra ponds. Steller's eiders may be more vulnerable to lead poisoning during egg laying and incubation as they continue to forage throughout nesting, whereas spectacled eider females largely fast during incubation.
Ducklings could be exposed to lead pellets in ponds after they hatch and begin foraging in tundra ponds.

The toxic effect of lead poisoning varies among individuals but includes lethal and sublethal effects (Hoffman 1990). Ingestion of spent lead shot reduced annual survival of spectacled eiders on the Y-K Delta in Alaska (Franson et al. 1995, Flint et al. 1997, Flint and Grand 1997, Grand et al. 1998, Flint and Herzog 1999, Flint et al. 2016). Similar rates of exposure have been found in long-tailed ducks (*Clangula hyemalis*). Steller's eiders breeding near Utqiaġvik on the North Slope showed high levels and rates of exposure (Trust et al. 1997, A. Matz, unpublished data), and 11 percent of long-tailed ducks captured northeast of Teshukpuk Lake on the North Slope in 1980 had lead shot in their gizzards (Taylor 1986). Lead shot was identified as the source of high and harmful lead levels through blood samples, radiographs, necropsy, and lead isotope analysis (Matz et al., in prep.).

The use of lead shot for hunting waterfowl has been illegal since 1991 in Alaska, and the Service intensified efforts in 1998 to enforce prohibitions against the possession and use of lead shot for migratory bird hunting. Later, the State of Alaska, at the request of regional advisory boards, passed more restrictive regulations that prohibit the use of lead shot for upland game bird hunting on the North Slope and all bird and small game hunting on the Y- K Delta.

There are indications that compliance with these regulations is improving as a result of outreach, education, and enforcement. In recent years, indices of lead shot use such as examination of spent shell casings, checking for illegal shot in stores, and checks of hunters have shown improvement. However, this has varied regionally; compliance was considered "excellent" in portions of the Y-K Delta (G. Peltola, Refuge Manager, pers. comm.) in 2009 although lead shot was still available in stores and hunters were found in possession of lead shot on the North Slope (USFWS, unpublished observations). Further, permafrost under shallow water bodies contributes to the persistence and availability of lead pellets years after their deposition (Flint and Schamber 2010).

The rate of deposition of lead shot in eider breeding habitat is expected to remain constant during the spring-summer Subsistence hunt but take is difficult to quantify. While outreach and LE efforts may have reduced the use of lead shot over time, any spent lead shot in breeding wetlands will remain available to Steller's and spectacled eiders for years.
However, we conclude that the contribution caused only by the 2023 spring-summer Subsistence hunt to this long-term problem will be minimal.

5.4.3 INCREASED HUMAN DISTURBANCE

The activities associated with the spring hunt will likely result in an increase of hunter presence in areas used by Steller's and spectacled eiders for breeding, feeding, and roosting on the North Slope and the Y-K Delta. During the spring-summer Subsistence take, hunters shooting waterfowl and/or collecting eggs may incidentally disturb listed eiders during egg laying, incubation, and brood rearing. The amount of increased disturbance will be dependent on hunter density, accessibility of nesting areas, and factors that influence the level of subsistence hunting required for rural Alaskans to meet their nutritional needs.

While little quantitative data is available on the effects of disturbance to nesting eiders, it is possible that disturbance of sufficient frequency and severity could result in decreased nest or brood survival. If females are regularly flushed from their nests during incubation, successful hatching may be precluded. After hatching, if brood rearing is frequently interrupted by human disturbance, fitness of the chicks may decrease and their vulnerability to predation may increase. However, the magnitude of disturbance necessary to affect nesting behaviors to an extent that declines in recruitment are observable is unknown.

Steller's eiders are particularly at risk to disturbance based on their proclivity to nesting near the road system outside of the largest population center on the North Slope. However, mid- season closures are included in the subsistence harvest regulations to minimize effects to nesting birds. Some hunters may illegally hunt during the closure; however, beginning in 2009 significant outreach and enforcement were successful at announcing the closure period and discouraging hunting during the closure near Utqiaġvik.

Nesting spectacled eiders are distributed across the North Slope as well as the Y-K Delta. As spectacled eider nests are sparsely distributed across both nesting areas, it is unlikely that disturbance from hunters affects a large proportion of nesting spectacled eiders.

Given: 1) the uncertainty in how disturbance affects recruitment; 2) the spring-summer Subsistence mid-season closure and the indication of success of outreach and enforcement in encouraging compliance in Utqiaġvik, where the highest densities of Steller's eiders nest; and 3) the sparse distribution of spectacled eider nests across both breeding areas, we expect that the adverse effects to Steller's and spectacled eiders from disturbance as a result of the Action is not possible but the minimal effects from the Spring and summer subsistence harvest were included in the effects analysis.

5.4.4 LISTED EIDER CRITICAL HABITAT

Steller's eider critical habitat includes breeding areas on the Y-K Delta, molting and staging areas in the Kuskokwim Shoals, and molting areas on the Alaska Peninsula. 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. Lead shot deposition during subsistence hunting may affect the conservation value of these critical habitat units, particularly on the Y-K Delta breeding area where more hunting probably occurs than in other units. As stated above in Lead Contamination, the rate of lead deposition is difficult to quantify, and any spent lead shot in breeding wetlands will remain available to Steller's and spectacled eiders for years. However, we conclude that the contribution caused by the 2023 through 2037 Fall hunts to this long-term problem will be non-existent since lead shot is illegal, and therefore the Action is unlikely to adversely modify critical habitat for listed eiders.

6.0 CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of ESA.

6.1 WHOOPING CRANE

Whooping cranes are exposed to a variety of hazards such as collision with obstructions, predators, disease, and illegal shooting. Snow and hail storms, low temperatures, and drought can present navigational handicaps or reduce food availability. Collision with powerlines is the most prevalent cause of death for fledged whooping cranes, accounting for the death or serious injury of at least 45 whooping cranes between 1956 and 2006 (Stehn and Wassenich 2008). Most deaths, other than those of chicks, are believed to occur during migration (CWS and USFWS 2007). Mortality from April through November is three times greater than that occurring on the wintering grounds (Lewis et al. 1992). Conversion of wetlands and prairie to hay and grain production made much of their original habitat unsuitable. The frequent stopovers necessary during migration become increasingly perilous as more land is developed for agriculture, energy (e.g., wind turbines and associated powerline infrastructure), industry or human habitation, and fewer suitable resting sites remain (Nebraska Game and Parks Commission 2002). Direct habitat loss from draining and clearing wetlands and human disturbance in breeding areas and along the migration routes is expected to continue.

6.2 STELLER'S AND SPECTACLED EIDER

6.2.1 COMMUNITY GROWTH

Community growth is anticipated to continue across the North Slope. The footprints of North Slope villages will likely increase, along with associated infrastructure such as roads, powerlines, communication towers, landfills, and gravel pits and these activities may adversely affect listed species. The scale of impacts will depend not only on the amount of growth, but the location as it relates to eider habitat. For example, community development projects at Utqiaġvik may potentially impact Steller’s eiders to a much higher degree than developments at Point Lay.

Because over 97% of the Action Area is wetlands or open water (USGS National Land Cover Database), and listed eiders breed near and use wetland areas, a section 404 permit from the U.S. Army Corps of Engineers (COE) would likely be necessary for all large-scale community development projects that may impact eiders. The issuance of these permits would also trigger consultation under the ESA.

6.2.2 PROJECTED GROWTH IN HUNTER NUMBERS

The United States Census Bureau’s Kusilvak and Bethel census areas include areas where subsistence hunters on the Y-K Delta might encounter Steller’s or spectacled eiders. The North Slope census area encompasses the ACP breeding area for these two species. Estimated population in these census areas is presented for 2021, followed by projected populations in the same areas for 2030, 2040, and 2050 (Table 7).

Predicting future levels of take of either eider species as a result of population growth is

problematic. However, the Service anticipates that the potential number of subsistence hunters will grow in Alaska, indicating a continuing and growing need for careful management of the subsistence hunt and a need for long-term education, outreach, and law enforcement activities to protect listed species during the hunt.

Table 7. Projected human population increases in rural Alaska areas where Steller's and Spectacled Eiders are found during spring and summer

Year	Census Area		
	Bethel	Kusilvak	North Slope
2021	18,416	8,139	10,995
2030	18,902	9,024	11,647
2040	20,070	9,808	12,477
2050	21,540	10,905	13,211
Source: Alaska Department of Labor and Workforce Development 2022.			

6.2.3 OIL AND GAS DEVELOPMENT

Future oil and gas activities, and associated mechanisms of impact (i.e., habitat loss, disturbance, listed eider collision risk, increased predators, human-polar bear interactions etc.), whether in Federal or State waters or in the terrestrial environment on State, private, Native-owned, or Federal lands, would require Federal permits (e.g., project approval by BLM or BOEM, section 404 of the Clean Water Act authorization from the U.S. Army Corps of Engineers [USACE], and National Pollution Discharge Elimination System permits from the Environmental Protection Agency). Therefore, effects from these actions are not considered cumulative effects for the purposes of this Biological Opinion.

6.2.4 INCREASED SCIENTIFIC RESEARCH

Scientific research across the North Slope is increasing as concern about effects of climate change in the arctic grows. There are a number of long-term study plots near Utqiaġvik and National Petroleum Reserve in Alaska providing baseline data, further increasing interest in the area. While much research is conducted by universities and private institutions, all activities in National Petroleum Reserve in Alaska requires land use authorization by BLM and therefore, requires section 7 consultation. The Service has also consulted on the major long-term research area near Utqiaġvik, and researchers are currently conducting activities in ways that minimize impacts to listed eiders.

6.2.5 SUMMARY OF EFFECTS/CUMULATIVE EFFECTS AND INTERRELATED AND INTERDEPENDENT ACTIVITIES

In summary, we anticipate community growth, a gradual increase in subsistence hunter numbers (with community growth), terrestrial and offshore oil and gas development, scientific activities, and other activities will continue in the Action Area in coming decades. Most notably activities with potential to affect significant numbers of individuals of listed species (such as oil and gas development, community growth, and large-scale science projects) are expected to

require consultation under the ESA, whereas those that may not require consultation (such as non-federal research) will likely have minor impacts to only a few individuals.

7.0 CONCLUSIONS

After reviewing the above information, while some incidental take of the whooping crane and Steller's and spectacled eiders may occur as a result of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the whooping crane or Steller's and spectacled eider, and the action is not likely to result in destruction or adverse modification of their designated critical habitat.

7.1 STELLER'S AND SPECTACLED EIDERS

It is important to note that in reaching our conclusion, we have considered, and have not attempted to separate or exclude, the effects of the Alaska subsistence hunt (which is a distinct Action requiring a separate consultation earlier this year) from the effects of the fall hunt (which is the Action evaluated in this Biological Opinion). We have done this due to the difficulty in disentangling these sources of impact in available harvest estimates, and to ensure that all identified increments of impact were considered in reaching our jeopardy/non-jeopardy conclusion, as explained in the *Effects of the Action*. While this may result in confusion over which specific Service Action particular impacts should be linked to, we conclude this approach ensures all possible impacts are considered.

8.0 INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibits the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering.

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary and must be undertaken by the DMBM of the Service so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The DMBM has a continuing duty to regulate the activity covered by this incidental take statement. If the DMBM (1) fails to assume and implement the terms and conditions or (2) fails to require the States to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the DMBM must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(I)(3)].

8.1 WHOOPING CRANES

8.1.1 AMOUNT OR EXTENT OF TAKE

As previously described, shootings of whooping cranes during legal migratory bird hunting seasons are rare, due in large part to physical dissimilarities between whooping cranes and sandhill cranes or snow geese. In addition, with the continued implementation of the Contingency Plan for Federal-State Cooperative Protection of Whooping Cranes, the Service anticipates that the potential for incidental take is further reduced. Accordingly, the Service anticipates one whooping crane per year may be accidentally killed or injured by migratory bird hunters as a result of the proposed action. The incidental take is expected to be in the form of injury or death through shooting.

8.1.2 EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the whooping crane or destroy or adversely modify their critical habitat.

8.1.3 REASONABLE AND PRUDENT MEASURES

The Service concludes the following reasonable and prudent measures are necessary and appropriate to minimize take of whooping crane:

1) Work cooperatively with States and Tribes to reduce the likelihood that whooping cranes will be killed or injured by waterfowl hunters.
2) Monitor and report any incidental or illegal take of whooping cranes that is caused by waterfowl hunters. Any taking of whooping cranes must be immediately reported to Beth Forbus, Supervisory Fish and Wildlife Administrator, U.S. Fish and Wildlife Service, 500 Gold Avenue SW, Albuquerque, NM 87103 (Phone: 505-248-6681), who, in conjunction with her counterpart in the Canadian Wildlife Service, will determine the disposition of any live or dead specimens.

8.1.4 TERMS AND CONDITIONS

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

1) DMBM shall ensure that sandhill crane hunters in the States participating in the Federal State Contingency Plan receive educational materials that help identify whooping cranes. Educational materials will be made available when hunters obtain their Federal Sandhill Crane Hunting Permit.
    a. DMBM shall continue to work with those States where sandhill crane hunting licenses are issued over the Internet or have recently converted to a Point-of Sale Licensing Program (Texas and Colorado) to develop special informational materials for distribution to sandhill crane and snow goose hunters on how to identify whooping cranes.
    b. DMBM shall work collaboratively and cooperatively with the States participating in the Federal-State Contingency Plan by providing waterfowl hunters educational materials to help identify whooping cranes.
    c. DMBM shall continue to work cooperatively with the Central Flyway Council and States throughout the Central Flyway to coordinate the timing of sandhill crane hunting seasons and whooping cranes migration. Additional protective measures will be assessed as whooping crane populations increase and migration distribution changes.
    d. Any dead or injured whooping cranes must be immediately reported as indicated under Reasonable and Prudent Measures #2. Written notification shall be made within 5 calendar days and include the date, time, and location of the crane encounter; status of the bird when first encountered; photographs, if possible, including the head and bill, front with the wings stretched out, and back with the wings stretched out; and any other pertinent information.

2) DMBM shall continue to work with the Whooping Crane Recovery Coordinator to monitor the take of whooping cranes for the period of 2023-24 through 2037-38 to ensure that an average of no more than one whooping crane is incidentally taken a year during this 15-year period.

8.2 STELLER'S EIDER

8.2.1 AMOUNT OR EXTENT OF TAKE

There is the potential that shootings of Steller's eider may occur as a result of the proposed action. The Service anticipates that no more than 1 threatened Steller's eider may be incidentally taken each year.

8.2.2 EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the Steller's eider or destroy or adversely modify its critical habitat.

8.2.3 REASONABLE AND PRUDENT MEASURES

The Service concludes the following reasonable and prudent measures are necessary and appropriate to minimize take of Steller's eider:

1) Work cooperatively with Alaska Department of Fish and Game and Ecological Services, and in cooperation with the Alaska Migratory Bird Co-Management Council, other Service programs, and Conservation Partners to reduce the likelihood that Steller's eiders will be killed or injured by waterfowl hunters during the fall migratory bird sport hunting season.
2) Monitor and report any incidental or illegal take of Steller's eiders that is caused by waterfowl hunters in the vicinity of Utqiaġvik, Alaska, where birds are known to concentrate for nesting.

8.2.4 TERMS AND CONDITIONS

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

- The conservation measures developed during the 2009 Subsistence Harvest Season and as adopted as Service policies were implemented and will continue as long as the birds are within the vicinity of Utqiaġvik, Alaska. The educational outreach and monitoring are extensive enough to meet the reasonable and prudent measures for the 2023–38 sport hunting seasons.

- Any dead or injured Steller's eiders must be immediately reported to Neesha Stellrecht, Branch Lead, Endangered Species, U.S. Fish and Wildlife Service, 101 12th Avenue, Room 110, Fairbanks, AK 99701-6237 (Phone: 907-456-0297). Written notification shall be made within 5 calendar days and include the date, time, and location of the encounter; status of the bird when first encountered; photographs, if possible, including the head and bill, front with the wings stretched out, and back with the wings stretched out; and any other pertinent information.

- DMBM shall continue to work with the USFWS Alaska Region to coordinate and monitor the take of Steller's eider for the period of 2023-24 through 2037-38 to ensure that an average of no more than one Steller's eider is incidentally taken a year during this 15-year period.

8.3 SPECTACLED EIDER

8.3.1 AMOUNT OR EXTENT OF TAKE

There is the potential that shootings of spectacled eider may occur as a result of the proposed action. The Service anticipates that no more than 10 threatened spectacled eider may be incidentally taken each year.

8.3.2 EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the spectacled eider or destroy or adversely modify its critical habitat.

8.3.3 REASONABLE AND PRUDENT MEASURES

The Service concludes the following reasonable and prudent measures are necessary and appropriate to minimize take of spectacled eider:

1) Work cooperatively Alaska Department of Fish and Game and Ecological Services, and in cooperation with the Alaska Migratory Bird Co-Management Council, other Service programs, and Conservation Partners to reduce the likelihood that spectacled eiders will be killed or injured by waterfowl hunters during the fall migratory bird sport hunting season.
2) Monitor and report any incidental or illegal take of spectacled eiders that is caused by waterfowl hunters in the vicinity of Utqiaġvik, Alaska, where birds are known to concentrate for nesting.

8.3.4 TERMS AND CONDITIONS

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

- The conservation measures developed during the 2009 Subsistence Harvest Season and as adopted as Service policies were implemented and will continue as long as the birds are within the vicinity of Utqiaġvik, Alaska. The educational outreach and monitoring are extensive enough to meet the reasonable and prudent measures for the 2023-2024 through 2037-2038 sport hunting seasons.

- Any dead or injured spectacled eiders must be immediately reported to Neesha Stellrecht, Branch Lead, Endangered Species, U.S. Fish and Wildlife Service, 101 12th Avenue, Room 110, Fairbanks, AK 99701-6237 (Phone: 907-456-0297). Written notification shall be made within 5 calendar days and include the date, time, and location of the encounter; status of the bird when first encountered; photographs, if possible, including the head and bill, front with the wings stretched out, and back with the wings stretched out; and any other pertinent information.

- DMBM shall continue to work with the USFWS Alaska Region to coordinate and monitor the take of spectacled eider for the period of 2023-24 through 2037-38 to ensure that an average of no more than 10 spectacled eiders are incidentally taken a year during this 15-year period.

8.4 DISPOSITION OF DEAD OR INJURED LISTED SPECIES

Any injured or dead whooping crane, Steller's eider, or spectacled eider must be reported immediately by phone to the U.S. Fish and Wildlife Service Office of Law Enforcement where the animal is located (see Table 8). Written notification shall be made within 5 calendar days and include the date, time, and location of the encounter; status of the bird when first encountered; photographs, if possible, including the head and bill, front with the wings stretched out, and back with the wings stretched out; and any other pertinent information. This notification shall be sent to the Office of Law Enforcement, along with a copy to the appropriate Ecological Services Field Office as indicated under the Terms and Conditions for each species.

Table 8. U.S. Fish and Wildlife Office of Law Enforcement Contact Information

Region	Telephone
Alaska	907-786-3311
Southwest Region (AZ, NM, OK, TX)	505-248-7889
Midwest Region (IL, IN, IA, MI, MN, MO, OH, WI)	612-713-5320
Southeast Region (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN)	404-679-7057
Northeast Region (CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, VA, WV)	413-253-8274
Mountain-Prairie Region (CO, KS, MT, NE, ND, SD, UT, WY)	303-236-7540

9.0 CONSERVATION RECOMMENDATIONS

Section 7(a)(I) 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.

9.1 CONSERVATION RECOMMENDATIONS FOR LISTED MIGRATORY BIRDS

The following conservation measures are recommended for the benefit and recovery of all listed migratory birds.

9.1.1 LEAD SHOT CONSERVATION RECOMMENDATIONS

Lead poisoning as a result of hunting is known to be a continuing problem for target and non-target species. The use of lead shot for hunting waterfowl and certain other migratory game birds is prohibited. However, Region 2 (Arizona) provided comments in the past that lead poisoning was still a problem affecting bald eagles. Similar comments were made in the Biological Opinion on the 2003–04 Migratory Game Bird Hunting Regulations with a recommendation that further investigations into the pathways of lead in the environment were needed for these species. This concern is further substantiated in the report from the USGS National Wildlife Health Center's Wildlife Mortality Database, which details endangered and threatened species cases collected between Sept 1, 2008 and February 28, 2009, that were associated with hunting activity, gunshot wounds, or lead poisoning.

This report was submitted to supplement the monitoring requirements of last year's Biological Opinion for migratory bird hunting. There were no known cases reported during this period; however, in the past the bald eagle have been recovered in which cause of death was determined to be an unknown source of lead.

1) DMBM should monitor the incidence of lead poisoning for all listed species in all affected areas and further investigate the occurrences of lead poisoning in the States of AR, AZ, AK, CO, FL, IA, LA, MD, MN, MO, MS, ND, VA, and WI, wherever mortalities occur, to determine if further conservation measures need to be incorporated into the migratory game bird hunting regulations to discourage the use of lead shot for upland species.
2) DMBM should encourage and support State wildlife officials in efforts to enforce the ban on the use of lead shot in waterfowl hunting areas.

Region 7 notes that the State of Alaska, Native organizations, local governments and the Service have made great strides in reducing the deposition of lead shot from waterfowl hunting throughout Alaska's wetlands. We offer the following discretionary conservation recommendations as possible ways to further reduce the prevalence of lead shot within spectacled and Steller's eider habitats in Alaska.

1) The National Refuge System in Alaska should evaluate the feasibility of phasing out the use of toxic lead shot (not including rifle ammunition or shotgun slugs) for all hunting within the range of spectacled and Steller's eiders on the Yukon Delta NWR.
2) The Service should continue to work with villages, Native organizations, ADF&G, and other Federal agencies to eliminate the use of lead shot for waterfowl hunting in Alaska.

3) The Service should work with villages, Native organizations, ADF&G, and other Federal agencies to consider the prohibition of lead shot (not including rifle ammunition or shotgun slugs) for all hunting throughout the range of spectacled and Steller's eiders.

9.1.2 NENE

As discussed in Appendix A, the Hawaiian goose, or nene, is not likely to be adversely affected by the proposed action. While the present understanding of the use of dogs to hunt mourning dove on the Island of Hawaii does not indicate any potential adverse effects, there is a very low risk that dogs may mistakenly flush, injure, or kill adult or juvenile nene. We suggest that DMBM develop additional information to support the present determination that nene are not likely to be adversely affected.

1) DMBM should, in cooperation with state wildlife agency and Endangered Species staff, explore if there is any evidence that would indicate any potential adverse effects to the nene involving the use of dogs when hunting mourning doves.
2) DMBM should also educate game bird hunters about the nene, where they might nest and live, and possible problems associated with the use of dogs.

The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of DMBM's 7(a)(l) responsibility for these species. The DMBM should notify the Endangered Species Program of the implementation of any conservation recommendations.

10.0 REINITIATION – CLOSING STATEMENT

This concludes formal consultation on the proposed action. As provided in 50 CFR §402.16, reinitiation 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 that may affect listed species or critical habitat in a matter or to an extent not considered in this Biological Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Biological Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

11.0 REFERENCES

Aars, J., and R.A. Ims. 2002. Intrinsic and Climatic Determinants of Population Demography: The Winter Dynamics of Tundra Voles. Ecology 83:3449-3456.

Adler, P.H., J.A. Barzen, E. Gray, A.E. Lacy, R.P. Urbanek, S.J. Converse. 2018. The dilemma of pest suppression in the conservation of endangered species. Conservation Biology 33(4):788-796.

Ad Hoc Eastern Population Sandhill Crane Committee. 2010. Management Plan for the Eastern Population of Sandhill Cranes. Minneapolis, MN. 36 pp.

Alaska Department of Labor and Workforce Development. 2022. Alaska Population Projections: 2021 to 2050. Published June 2022. Accessed at: https://live.laborstats.alaska.gov/pop/projections/pub/popproj.pdf. Accessed on: January 27, 2023.

Alaska Housing Finance Corporation (AHFC). 2017. 2017 Alaska Housing Assessment, Kusilvak Census Area. Accessed on: February 13, 2023. Accessedat: https://www.ahfc.us/application/files/4715/1510/4565/Final_-_Kusilvak_Census_Area_Summary.pdf

Alaska Migratory Birds Co-management Council (AMBCC). 2022. Regulations for the 2022 Alaska Subsistence Spring/Summer Migratory Bird Harvest. Effective April 2 – August 31, 2022. Accessed at https://www.fws.gov/sites/default/files/documents/Mig%20Bird%202022%20Spring%20Summer%20lo-res%20final508c_0.pdf. Accessed on January 27, 2023.

Amundson, C.L., P.L. Flint, R.A. Stehn, R.M. Platte, H.M. Wilson, W.W. Larned, and J.B. Fischer. 2019. Spatio-temporal Population Change of Arctic-breeding Waterbirds on the Arctic Coastal Plain of Alaska. Avian Conservation & Ecology 14:1–198.

Andresen, C.G., and V.L. Lougheed. 2015. Disappearing Arctic Tundra Ponds: Fine-scale Analysis of Surface Hydrology in Drained Thaw Lake Basins Over a 65 Year Period (1948-2013). Journal of Geophysical Research: Biogeosciences 120:466–479.

Anderson, B.A., and B. Cooper. 1994. Distribution and abundance of spectacled eiders in the Kuparuk and Milne Point oilfields, Alaska, 1993. Unpublished report prepared for ARCO Alaska, Inc., and the Kuparuk River Unit, Anchorage, Alaska by ABR, Inc., Fairbanks, Alaska, and BBN Systems and Technologies Corp., Canoga Park, CA. 71 pp.

Anderson, B.A., and S.M. Murphy. 1988. Lisburn Terrestrial Monitoring Program 1986 and 1987: The Effects of the Lisburn Powerline on Birds. Final report by ABR Inc. for ARCO Alaska.

Anderson, B.A., R.J. Ritchie, A.A. Stickney, and J.E. Shook. 2007. Avian Studies in the Kuparuk Oilfield, Alaska, 2006. Unpublished Report. Fairbanks, Alaska.

Anderson B., A.A. Stickney, R.J. Ritchie, and B.A. Cooper. 1995. Avian studies in the Kuparuk Oilfield, Alaska, 1994. Unpublished report for ARCO Alaska, Inc. and the Kuparuk River Unit, Anchorage, Alaska.

Archibald, G.W., J. Baldwin, and P. Konrad. 1976. Is sandhill hunting a threat to the whooping crane? Pages 207- 221 in J. C. Lewis, ed. Proc. International Crane Workshop. Oklahoma State Univ. Press, Stillwater, Oklahoma.

Arctic Climate Impact Assessment (ACIA). 2004. Impacts of a Warming Arctic: Arctic Climate Impacts Assessment. Cambridge University Press. Cambridge, United Kingdom. 146 pp.

Bacon, J. J., T.R. Hepa, H.K. Brower, Jr., M. Pederson., T.P. Olemaun, J.C. George, and B.G. Corrigan. 2011. Estimates of subsistence harvest for villages on the North Slope of Alaska, 1994–2003. Revised October 2011. North Slope Borough Department of

Wildlife Management. 105 pp.
Banko, P.C., J.M. Black, and W.E. Banko. 1999. Hawaiian Goose (Nene). The Birds of North America, No. 434.
Bart, J., and S.L. Earnst. 2005. Breeding ecology of spectacled eiders *Somateria fischeri* in northern Alaska. Wildfowl 55:85–100.
Boyce, M.S. 1987. Time-series Analysis and Forecasting of the Aransas-Wood Buffalo Whooping Crane Population. Pages 1-9, in J. C. Lewis and J. W. Ziewitz, eds. Proc. 1985 Crane Workshop. Platte River Whooping Crane Habitat Maintenance Trust and USFWS, Grand Island, Nebraska.
Bowman T.D., R.A. Stehn, and G. Walters. 2002. Population size and production of geese and eiders nesting on the Yukon-Kuskokwim Delta, Alaska in 2002. Unpublished report. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska. 22 pp.
Boyce, M.S., and R. S. Miller. 1985. Ten Year Periodicity in Whooping Crane Census. Auk 102(3):658-660.
Brooks, W.S. 1915. Notes on Birds from East Siberia and Arctic Alaska. Bulletin of the Museum of Comparative Zoology 59:361–413.
Buller, R. J. 1967. Sandhill crane study in the Central Flyway. USFWS Special Scientific Kept. Wildl. 113, Washington, D.C. 17 pp.
Bureau of Ocean Energy Management (BOEM). 2018. National OCS oil and gas leasing program.
Butler, M.J., C.R. Sanspree, J.A. Moon, and W. Harrell. 2022. Whooping Crane Survey Results: Winter 2021-2022. May 9, 2022. Accessed at: https://www.fws.gov/media/whooping-crane-update-winter-2021-2022. Accessed on December 20, 2022.
Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. International Recovery Plan for the Whooping Crane. Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 162 pp.
Chapin, F.S, G.R. Shaver, A.E. Giblin, K.J. Nadelhoffer, and J.A. Laundre. 1995. Responses of Arctic tundra to experimental and observed changes in climate. Ecology 76:694–711.
Coulson, J.C. 1984. The population dynamics of the Eider Duck *Somateria mollissima* and evidence of extensive non-breeding by adult ducks. Ibis 126:525–543.
Crick, H.Q.P. 2004. The impact of climate change on birds. Ibis 146:48–56
Danielson, S.L., O. Ahkinga, C. Ashijan, E. Basyuk, L. W. Cooper, L. Eisner, E. Farley, K.B. Iken, J.M. Grebmeier, L. Juranek, G. Khen, S.R. Jayne, T. Kikuchi, C. Ladd, K. Lu, R. M. Mccabe, G.W.K. Moore, S. Nishino, F. Ozenna, R.S. Pickart, I. Polyakov, P.J. Stabeno, R. Thoman, W.J. Williams, K. Wood, and T.J. Weingartner. 2020. Manifestation and Consequences of Warming and Altered Heat Fluxes Over the Bering and Chukchi Sea Continental Shelves. Deep-Sea Research Part II: Topical Studies in Oceanography 177.
Dau, C.P. 1987. Birds in nearshore waters of the Yukon-Kuskokwim Delta, Alaska. Murrelet 68:12–23.
Dau, C.P. 1974. Nesting biology of the spectacled eider, *Somateria fischeri* (Brandt), on the Yukon-Kuskokwim Delta, Alaska. University of Alaska, Fairbanks, Alaska. M.S. thesis. 72 pp.
Dau, C.P., and S.A. Kistchinski. 1977. Seasonal movements and distribution of the spectacled eider. Wildfowl 28:65–75.
Day, R. H. 1998. Predator populations and predation intensity on tundra-nesting birds in relation to human development. Report prepared by ABR Inc., for Northern Alaska Ecological Services, U.S. Fish and Wildlife Service, Fairbanks, AK.
Day, R.H., J.R. Rose, R.J. Ritchie, J.E. Shook, and B.A. Cooper. 2003. Collision Potential of Eiders and Other Birds Near a Proposed Windfarm at St. Lawrence Island, October–

November 2002. Fairbanks, Alaska.
Dhondt, A. A. 1987. Cycle of lemmings and geese: A comment on the hypothesis of Roselaar and Summers. Bird Study 34:151–154.
Dick, M.H., and L.S. Dick. 1971. The natural history of Cape Pierce and Nanvak Bay, Cape Newenham National Wildlife Refuge, Alaska. U.S. Fish and Wildlife Service. Unpublished report. Bethel, Alaska. 77 pp.
Drent, R.H., and S. Daan. 1980. The Prudent Parent: Energetic Adjustments in Avian Breeding. Ardea, 55(1–2): 225-252.
Eberhardt, L.E., R.A. Garrott, and W.C. Hanson. 1983. Winter movements of Arctic foxes, *Alopex lagopus*, in a Petroleum Development Area. The Canadian Field Naturalist 97:66–70.
Ely, C.R., C.P. Dau, and C.A. Babcock. 1994. Decline in population of spectacled eiders nesting on the Yukon- Kuskokwim Delta, Alaska. Northwestern Naturalist 75:81-87.
Fay, F.H., and T.J. Cade. 1959. An ecological analysis of the avifauna of St. Lawrence Island, Alaska. University of California Publications Zoology 63: 73–150.
Feder, H.M., N.R. Foster, S.C. Jewett, T.J. Weingartner, and R. Baxter. 1994a. Mollusks in the Northeastern Chukchi Sea. Arctic 47(2): 145–163.
Feder, H.M., A.S. Naidu, S.C. Jewett, J.M. Hameedi, W.R. Johnson, and T.E. Whitledge. 1994b. The northeastern Chukchi Sea: benthos-environmental interactions. Marine Ecology Progress Series 111:171–190.
Feder, H.M., A.S. Naidu, J.M. Hameedi, S.C. Jewett, and W.R. Johnson. 1989. The Chukchi Sea Continental Shelf: Benthos–Environmental Interactions. Final Report. NOAA-Ocean Assessment Division, Anchorage, Alaska. 294 pp.
Fischer, J.B., and R.A. Stehn. 2013. Nest population size and potential production of geese and spectacled eiders on the Yukon-Kuskokwim Delta, Alaska, 1985-2012. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, Alaska.
Fischer, J.B., R.A. Stehn, and G. Walters. 2011. Nest Population Size and Potential Production of Geese and Spectacled Eiders on the Yukon-Kuskokwim Delta, Alaska, 1985-2011.
Flint, P.L., and J.L. Schamber. 2010. Long-term persistence of spent lead shot in tundra wetlands. Journal of Wildlife Management 74:148–151.
Flint, P.L., and M.P. Herzog. 1999. Breeding of Steller's eiders, Polysticta stelleri, on the Yukon-Kuskokwim Delta, Alaska. Canadian Field-Naturalist 113:306-308.
Flint, P.L., and J.B. Grand. 1997. Survival of spectacled eider adult females and ducklings during brood rearing. Journal of Wildlife Management 61:217-221.
Flint, P.L., J.B. Grand, M.R. Petersen, and R.F. Rockwell. 2016. Effects of Lead Exposure, Environmental Conditions, and Metapopulation Processes on Population Dynamics of Spectacled Eiders. North American Fauna:1–41.
Flint, P.L., J.A. Morse, J.B. Grand, and C.L. Moran. 2006. Correlated Growth and Survival of Juvenile Spectacled Eiders: Evidence of Habitat Limitation? The Condor 108:901-911.
Flint, P.L., J.B. Grand, J.A. Morse, and T.F. Fondell. 2000. Late summer survival of adult female and juvenile spectacled eiders on the Yukon-Kuskokwim Delta, Alaska. Waterbirds 23:292–297.
Flint, P.L., M.R. Petersen, and J.B. Grand. 1997. Exposure of spectacled eiders and other diving ducks to lead in western Alaska. Canadian Journal of Zoology 75:439–443.
Franson, J., M.R. Petersen, C. Meteyer, and M. Smith. 1995. Lead poisoning of spectacled eiders (*Somateria fischeri*) and of a common eider (*Somateria mollissima*) in Alaska. Journal of Wildlife Diseases 31:268– 271.
Fuller, A.S., and J.C. George. 1997. Evaluation of subsistence harvest data from the North Slope Borough 1993 census for eight North Slope Villages for the calendar year 1992. North Slope Borough, Department of Wildlife Management, Barrow, Alaska. 152p.
Gabrielson, M., and K. Spragens, 2013. Monitoring of Nesting Spectacled Eiders on Kigigak

Island, Yukon Delta NWR, 201. Unpubl. Rep. Yukon Delta NWR, Bethel, AK.
Gilg, O., B. Sittler, and I. Hanski. 2009. Climate Change and Cyclic Predator-prey Population Dynamics in the High Arctic. Global Change Biology 15:2634–2652.
Gill, R.E., M.R. Petersen, and P.D. Jorgensen. 1981. Birds of northcentral Alaska Peninsula, 1978–80. Arctic 34:286–306.
Gorman, M.L. and H. Milne. 1971. Seasonal changes in adrenal steroid tissue of the common eider *Somateria mollissima* and its relation to organic metabolism in normal and oil polluted birds. Ibis 133:218–228.
Graff, N.R. 2018. Breeding ecology of Steller's and spectacled eiders nesting near Utqiaġvik, Alaska, 2016-2017. Technical Report. USFWS, Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska.
Graff, N. 2020. Breeding Ecology of Steller's and Spectacled Eiders Nesting Near Utqiagvik, Alaska, 2018-2019. U. S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska.
Graff, N.R. 2016. Breeding ecology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2015. U. S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. Technical Report. 51 pp.
Grand, J.B., and P.L. Flint. 1997. Productivity of Nesting Spectacled Eiders on the Lower Kashunuk River, Alaska. The Condor 99:926–932.
Grand, J. B., P. L. Flint, M. R. Petersen, and C. L. Moran. 1998. Effect of Lead Poisoning on Spectacled Eider Survival Rates. The Journal of Wildlife Management 62:1103–1109.
Grebmeier, J.M., and L.W. Cooper. 1995. Influence of the St. Lawrence Island Polynya Upon the Bering Sea Benthos. Journal of Geophysical Research 100:4439-4460.
Grebmeier, J.M., B.A. Bluhm, L.W. Cooper, S.L. Danielson, K.R. Arrigo, A.L. Blanchard, J.T. Clarke, R.H. Day, K.E. Frey, R.R. Gradinger, M.Kędra, B. Konar, K.J. Kuletz, S.H. Lee, J.R. Lovvorn, B.L. Norcross, and S.R. Okkonen. 2015. Ecosystem Characteristics and Processes Facilitating Persistent Macrobenthic Biomass Hotspots and Associated Benthivory in the Pacific Arctic. Progress in Oceanography 136:92–114.
Harwood, C., and T. Moran. 1993. Productivity, brood survival, and mortality factors for spectacled eiders on Kigigak Island, Yukon Delta NWR, Alaska, 1992. Unpublished report prepared for U.S. Fish and Wildlife Service, Bethel, Alaska. 11pp + Appendix.
Hinzman, L.D., N.D. Bettez, W.R. Bolton, F.S. Chapin, M.B. Dyurgerov, C.L. Fastie, B. Griffith, R.D. Hollister, A. Hope, H.P. Huntington, A.M. Jensen, G.J. Jia, T. Jorgenson, D.L. Kane, D.R. Klien, G. Kofinas, A.H. Lynch, A.H. Lloyd, A.D. McGuire, F.E. Nelson, W.C. Oechel, T.E. Osterkamp, C.H. Racine, V.E. Romanovsky, R.S. Stone, D.A. Stow, M. Strum, C.E. Tweedie, G.L. Vourlitis, M.D. Walker, D.A. Walker, P.J. Webber, J.M. Welker, K.S. Winklet, K. Yoshikawa. 2005. Evidence and implications of recent climate change in northern Alaska and other arctic regions. Climatic Change 72: 251–298.
Hoffman, D.J. 1990. Embryotoxicity and teratogenicity of environmental contaminants to bird eggs. Review of Environmental Toxicology 115: 39.
Hollmén, T.E., and J.C. Franson. 2015. Infectious Diseases, Parasites, and Biological Toxins in Sea Ducks. Pages 97–124 in J.-P. L. Savard, D. V. Derksen, D. Esler, and J. M. Eadie, editors. Ecology and Conservation of North American Sea Ducks. CRC Press, LLC, Boca Raton, Florida.
Hollmén, T.E., C. Debroy, PL. Flint, D.E. Safine, J.L. Schamber, A.E. Riddle, and K.A. Trust. 2010. Molecular Typing of Escherichia coli Strains Associated with Threatened Sea Ducks and Near-shore Marine Habitats of Southwest Alaska. Environmental Microbiology Reports 3:262–269.
Huntington, H. P. 2009. Documentation of subsistence harvest of spectacled eiders and Steller's eiders in western and northern Alaska: a literature review. 23834 The Clearing

Drive, Eagle River, Alaska 99577. Yellow- billed loon harvest report, 31 August 2009.
Intergovernmental Panel on Climate Change (IPCC). 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland.
Intergovernmental Panel on Climate Change (IPCC). 2019. IPCC Special Report on the Ocean and Cryosphere in a Changing Climate. Intergovernmental Panel on Climate Change. Accessed February 15, 2023. Accessed at: https://www.ipcc.ch/srocc/.
International Crane Foundation. 2022a. All the Whooping Cranes in the World. Population Numbers Reported in 2022.
International Crane Foundation. 2022b. Whooping Crane Eastern Population Update - December 2022. Published December 7, 2022. Accessed at: https://savingcranes.org/2022/12/whooping-crane-eastern-population-update-december-2022/. Accessed on: December 20, 2022.
International Crane Foundation. 2022c. Whooping Crane Eastern Population Update - July 2022. Published July 6, 2022. Accessed at: https://savingcranes.org/2022/07/whooping-crane-eastern-population-update-july-2022/. Accessed on: December 23, 2022.
International Crane Foundation. 2022d. Whooping Crane Shootings – What We Know and Why it Matters. Published January 31, 2022. Accessed at: https://savingcranes.org/2022/01/whooping-crane-shootings-what-we-know-and-why-it-matters/. Accessed on: December 23, 2022.
Johnson, R., and W. Richardson. 1982. Waterbird migration near the Yukon and Alaska coast of the Beaufort Sea: II. Molt migration of seaducks in summer. Arctic 35:291–301.
Jones, K.L., G.L. Krapu, D.A. Brandt, and M.V. Ashley. 2005. Population genetic structure in migratory sandhill cranes and the role of Pleistocene glaciations. Molecular Ecology 14:2645-2657.
Jorgenson, T., and C. Ely. 2001. Topography and Flooding of Coastal Ecosystems on the Yukon-Kuskokwim Delta, Alaska: Implications for Sea-level Rise. Journal of Coastal Research 17:124–136.
Kansas Department of Wildlife and Parks. 2022. 2022-2023 Kansas Hunting and Furharvesting Regulations Summary.
Kansas Department of Wildlife and Parks. 2021. New for 2021-2022. Sandhill Crane Hunting Zones. Accessed January 24, 2023. Accessed at: https://ksoutdoors.com/layout/set/print/Hunting/Hunting-Regulations/NEW-FOR-2021-2022.
Kansas Department of Wildlife and Parks. n.d. Hunting – Hunting at Cheyenne Bottoms. Accessed January 24, 2023. Accessed at: https://ksoutdoors.com/KDWP-Info/Locations/Wildlife-Areas/Southwest/Cheyenne-Bottoms.
Kausrud, K.L., A. Mysterud, H. Steen, J.O. Vik, E. Østbye, B. Cazelles, E. Framstad, A.M. Eikeset, I. Mysterud, T. Solhøy, and N.C. Stenseth. 2008. Linking Climate Change to Lemming Cycles. Nature 456:93–97.
Kokhanova, V.Yu., and Solovyeva, D.V. 2015. Spectacled Eider (*Somateria fischeri*) Research in the Chaun-Delta, West Chukotka, Russia, 2015. Annual Report prepared for Fairbanks Fish and Wildlife Field Office, USFWS, #110, 101 –12th Avenue, Fairbanks, Alaska 99701, USA. 24 p.
Kondratev, A. and L. Zadorina. 1992. Comparative ecology of the king eider Somateria spectabilis and spectacled eider Somateria fischeri on the Chaun tundra. Zool. Zhur. 71:99–108. (in Russian; translation by J. Pearce, National Biological Survey, Anchorage, Alaska).
Konrad, P. M. 1987. Expanded sandhill crane hunting in the Dakotas and Oklahoma threatens

endangered whooping cranes. Pages 69-77 in Proc. 1985 Crane Workshop. Platte River Whooping Crane Habitat Maintenance Trust and USFWS, Grand Island, Nebraska.
Korschgen, C.E. 1977. Breeding stress of female eiders in Maine. Journal of Wildlife Management 41:360–373.
Kraft, M. and H. Hands. 2005. Appraisal of regulatory options for the sandhill crane season in Kansas. Unpublished report. 9 pp.
Lake, B. C. 2007. Nesting Ecology of Spectacled and Common Eiders on Kigigak Island, Yukon Delta NWR, Alaska, 2007. Unpublished report. U.S. Fish and Wildlife Service, Yukon Delta National Wildlife Refuge, Bethel, Alaska 99559. 18 pp.
Larned, W.W. 2012. Steller's eider spring migrations surveys, southwest Alaska 2011. U. S. Fish and Wildlife Service, Waterfowl Management. Soldotna, Alaska. 24 pp.
Larned, W.W. 2007. Steller's eider spring migration surveys southwest Alaska, 2007. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, Alaska. 26 pp.
Larned, W.W. 2005. Aerial survey of lower Cook Inlet to locate molting flocks of Steller's eiders and mergansers. Trip report, 14 September 2005. U.S. Fish and Wildlife Service, Soldotna, Alaska. 9 pp.
Larned, W. W. 2000a. Steller's eider spring migration surveys, 2000. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska
Larned, W. W. 2000b. Aerial surveys of Steller's eiders and other water birds and marine mammals in southwest Alaska areas proposed for navigation improvements by the U.S. Army Corps of Engineers, Alaska. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.
Larned, W. W. 1998. Steller's eider spring migration surveys, 1998. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.
Larned, W., K. Bollinger, and R. Stehn. 2012. Late winter population and distribution of spectacled eiders (*Somateria fischeri*) in the Bering Sea, 2009 and 2010. USFWS. Fish and Wildlife Service, Division of Migratory Bird Management, Anchorage, Alaska. January 12, 2012. 23 pp.
Larned, W.W., R.S. Stehn, and R.M. Platte. 2011. Waterfowl Breeding Population Survey Arctic Coastal Plain, Alaska 2010. U.S. Fish and Wildlife Service, Division of Migratory Bird Management. November 23, 2011.
Larned, W. W., R. Platte and R. Stehn. 2009. Waterfowl breeding population survey, Arctic Coastal Plain, Alaska, 2008. Unpublished report, U.S. Fish and Wildlife Service, Anchorage, Alaska. 42 pp.
Larned, W. W., R. Stehn, and R. Platte. 2008. Waterfowl breeding population survey, Arctic Coastal Plain, Alaska 2007. U. S. Fish and Wildlife Service, Division of Migratory Bird Management. Anchorage, Alaska. 44pp.
Larned, W. W., G. R. Balogh, and M.R. Petersen. 1995. Distribution and abundance of spectacled eiders (Somateria fischeri) in Ledyard Bay, Alaska, September 1995. Unpublished progress report, U.S. Fish and Wildlife Service, Anchorage, Alaska. 11 pp.
Larned, W. W., B Butler, and G Balogh. 1993. Progress report: Steller's eider spring migration surveys southwest Alaska, 1993. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.
Larter, N. C. 1998. Collared lemming abundance diet and morphometrics on Banks Island, 1993-1996. Manuscript report, Department of Resources, Wildlife, and Economic Development, Government of the Northwest Territories, Inuvik, Northwest Territories, Canada.
Leopold, A. 1949. A Sand County Almanac and Sketches Here and There. Oxford University Press, New York. 228 pp.
Lewis, J.C., 1995. Whooping Crane *(Grus Americana).* In The Birds of North America, NO. 153

(A.Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D.C.
Lewis, J.C. 1977. Sandhill Crane. Pp. 4-43 in Sanderson, G. C., ed., Management of Migratory Shore and Upland Game Birds in North America. Intl. Assoc. Fish and Wildl. Agencies, Washington, D. C.
Lewis, J. C., E. Kuyt, K. E. Schwindt, and T. V. Stehn. 1992. Mortality in fledged cranes of the Aransas-Wood Buffalo population. Pages 145-148 in D. A. Wood, ed. Proc. 1988 N. Am. Crane Workshop. Florida Game and Fresh Water Fish Commission, Tallahassee.
Lougheed, V.L., M.G. Butler, D.C. McEwen, and J.E. Hobbie. 2011. Changes in Tundra Pond Limnology: Re-sampling Alaskan Ponds after 40 years. Ambio 40:589–599.
Louisiana Department of Wildlife and Fisheries. 2022. 2021-2022 Louisiana Whooping Crane Report. 1 July 2021 through 30 June 2022. Accessed at https://www.wlf.louisiana.gov/assets/Resources/Publications/Whooping_Crane/2021_22-Louisiana-Whooping-Crane-Report.pdf. Accessed on December 20, 2022.
Lovvorn, J.R., M.F. Raisbeck, L.W. Cooper, G.A. Cutter, M.W. Miller, M.L. Brooks, J.M. Grebmeier, A.C. Matz, and C.M. Schaefer. 2013. Wintering Eiders Acquire Exceptional Se and Cd Burdens in the Bering Sea: Physiological and Oceanographic Factors. Marine Ecology Progress Series 489:245–261.
Lovvorn, J.R., J.M. Grebmeier, L.W. Cooper, J.K. Bump, and S.E. Richman. 2009. Modeling marine protected areas for threatened eiders in a climatically changing Bering Sea. Ecological Applications 19:1596–1613.
Lovvorn, J.R., S.E. Richman, J.M. Grebmeier, and L.W. Cooper. 2003. Diet and body condition of spectacled eiders wintering in the pack ice of the Bering Sea. Polar Biology 26:259–267.
MacLean, S.F., Jr., B.M. Fitzgerald, and F.A. Pitelka. 1974. Population Cycles in Arctic Lemmings: Winter Reproduction and Predation by Weasels. 6: 1-12.
Mallek, E. J., R. Platte, and R. Stehn. 2007. Aerial breeding pair surveys of the Arctic Coastal Plain, Alaska, 2007. Unpub. Rep. U.S. Fish and Wildlife Service, Anchorage, AK 25 pp.
Manville, A. M. 2005. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: state of the art and state of the science - next steps toward mitigation. Pp. 1051–1064 in Bird Conservation Implementation in the Americas: Proceedings 3rd International Partners in Flight Conference 2002, USDA Forest Service General Technical Report PSW-GTR-191, Pacific Southwest Research Station, Albany, California (C. J. Ralph & T. D. Rich, eds.).
Martin, P. D., D. C. Douglas, T. Obritschkewitsch, And S. Torrence. 2015. Distribution and movements of Alaska- breeding Steller's eiders in the non-breeding period. The Condor 117:341–353.
Matz, A., and P. Flint. 2009. Lead isotopes indicate lead shot exposure in Alaska-breeding waterfowl. P. 174 in Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans (R. T. Watson, M. Fuller, M. Pokras & W. G. Hunt, eds.). The Peregrine Fund, Boise, Idaho, USA.
Meine C. D., and G. W. Archibald. Compilers. 1996. The Cranes: Status Survey and Conservation Action Plan. IUCN/SSC Crane Specialist Group, IUCN the World Conservation Union, Gland, Switzerland. 282 pp.
Metzner, K.A. 1993. Ecological strategies of wintering Steller's eiders on Izembeck Lagoon and Cold Bay, Alaska. M.S. Thesis, University of Missouri, Columbia, MO. 193 pp.
Miller, M. W. C., J. R. Lovvorn, A. C. Matz, R. J. Taylor, and D. E. Safine. 2016. Trace elements in sea ducks of the Alaskan Arctic coast: patterns of variation among species, sexes, and ages. Archives of Environmental Contamination and Toxicology 71:297.
Milne, H. 1976. Body weights and carcass composition of the common eider. Wildfowl 27:115–122.

Moore, C. B., and K. M. Sowl. 2017. Monitoring of nesting spectacled eiders on Kigigak Island, Yukon Delta NWR, 2015. Unpublished Report. Bethel, Alaska.

Moran, T. 1995. Nesting ecology of spectacled eiders on Kigigak Island, Yukon Delta NWR, Alaska, 1994. Unpublished report prepared for U.S. Fish and Wildlife Service, Bethel, Alaska. 8pp + appendix.

Moran, T., and C. Harwood. 1994. Nesting ecology, brood survival, and movements of spectacled eiders on Kigigak Island, Yukon Delta NWR, Alaska, 1993. Unpublished report prepared for U.S. Fish and Wildlife Service, Bethel, Alaska. 33pp + appendix.

Naves, L.C. 2009. Alaska migratory bird co-management council subsistence harvest assessment program 2004- 2007 draft final harvest estimates. Alaska Department of Fish and Game, Division of Subsistence, Anchorage, Alaska. Draft report. 17 July 2009. 183 pp.

Naves, L.C., A.J. Knight, and L.F. Mengak. 2021. Alaska Subsistence Harvest of Birds and Eggs, 2004-2020 Data Book, Alaska Migratory Bird Co-Management Council. Special Publication No. 2021-05. December 2021.

Nebraska Game and Parks Commission. 2022. Whooping Crane *Grus Americana*. Accessed at : http://outdoornebraska.gov/whoopingcrane/. Accessed on December 20, 2022.

Nedelman, J., J.A. Thompson, and R.J. Taylor. 1987. The Statistical Demography of Whooping Cranes. Ecology 68(5):1401-1411.

Oberholser, H.C. 1921. Notes on North American Birds. X. The Auk 38:79-82.

Obritschkewitsch, T., P. Martin, and R. Suydam. 2001. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 1999-2000. Northern Ecological Services, U.S. Fish and Wildlife Service, Technical Report NAES-TR-01-04, Fairbanks, Alaska 113 pp.

Obritschkewitsch, T., R. Ritchie, and J. King. 2008. Steller's eider surveys near Barrow, Alaska, 2007. Final Report. ABR, Inc., Fairbanks, AK. 17 pp.

Obritschkewitsch, T., and A. Gall. 2020. Steller's eider surveys near Utqiaġvik, Alaska, 2019. ABR, Inc. Fairbanks, Alaska. 14 pp.

Obrischkewitsch, T. and R. J. Ritchie. 2011. Steller's eider surveys near Barrow, Alaska, 2010. Final Report. ABR, Inc., Fairbanks, Alaska. 13 pp.

Oechel, W.C., G.L. Vourlitis, S.J. Hastings, and S.A. Bochkarev. 1995. Change in Arctic CO2 flux over two decades: Effects of climate change at Barrow, Alaska. Ecological Adaptations 5:846–855.

Omelak, J., S. Tahbone, E. Trigg, E. Sebwenna, C. Booshu, and D. Iya. 2009. DRAFT: Subsistence uses of yellow-billed loons on St. Lawrence Island. Prepared by Kawerak Natural Resources, Subsistence Program, P.O. Box 948, Nome, Alaska 99762. Prepared for the U.S. Fish and Wildlife Service, Region 7. 12 pp.

Overland, J., S. Rodionov, S. Minobe, and N. Bond. 2008. North Pacific regime shift: Definitions, issues, and recent transitions. Progress in Oceanography 77:92-102.

Parker, H., and H. Holm. 1990. Pattern of nutrient and energy expenditure in female Common eiders nesting in the high arctic. Auk 107:660–668.

Parks Canada. 2021. Wood Buffalo National Park Community Information Update. September 2021 Whooping Crane Conservation Update. Accessed at: http://parkscanadahistory.com/publications/woodbuffalo/whooping-crane-ciu-e-sep-2021.pdf. Accessed on December 21, 2022.

Pearce, J.M., D. Esler and A.G. Degtyarev. 1998. Birds of the Indigirka River Delta, Russia: historical and biogeographic comparisons. Arctic 51:361–370.

Pearse, A.T., D.A. Brandt, B.K. Hartup, and M.T. Bidwell. 2019. Mortality in Aransas-Wood Buffalo Whooping Cranes: Timing, Location, and Causes. USGS Northern Prairie Wildlife Research Center.

Petersen, J.L., R. Bischof, G.L. Krapu, A.L. Szalanski. 2003. Genetic Variation in the

Midcontinental Population of Sandhill Cranes, Grus canadensis. Biochemical Genetics 41:1-12.
Petersen, M.R. 1981. Populations, feeding ecology and molt of Steller's eiders. Condor 83:256- 262.
Petersen, M.R. 1980. Observations of wing-feather molt and summer feeding ecology of Steller's eiders at Nelson Lagoon, Alaska. Wildfowl 31:99-106.
Petersen, M.R. and P.L. Flint. 2002. Population structure of pacific common eiders breeding in Alaska. Condor 104:780–787.
Petersen, M.R., M.J. Sigman. 1977. Field studies at Cape Pierce, Alaska 1976. Pages 633–693 *in* Environmental Assessment of the Alaskan Continental Shelf, Annual Reports of Principal Investigators, Vol. 4. NOAA, Boulder, Colorado.
Petersen, M.R., W.W. Larned, and D.C. Douglas. 1999. At-sea distribution of spectacled eiders: a 120-year-old mystery resolved. The Auk 116(4):1009–1020.
Petersen, M., D. Douglas, and D. Mulcahy. 1995. Use of implanted satellite transmitters to locate spectacled eiders at sea. Condor 97: 276–278.
Petersen, M.R., D.N. Weir, M.H. Dick. 1991. Birds of the Kilbuck and Ahklun Mountain Region, Alaska. North American Fauna No. 76. 158 pp.
Pitelka, F.A., P.Q. Tomich, G.W. Treichel. 1955. Ecological relations of jaegers and owls as lemming predators near Barrow, Alaska. Ecological Monographs 25:85-117.
Platte, R.M., and R.A. Stehn. 2011. Abundance and trend of waterbirds on Alaska's Yukon–Kuskokwim Delta coast based on 1988 to 2010 aerial surveys. Unpublished report, U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska. April 29, 2011. 43 pp.
Portenko, L.A. 1989. Birds of the Chukchi Peninsula and Wrangel Island. Vol I. Smithsonian Institute and National Science Foundation, Washington, D.C.
Powell, A.N. and S. Backensto. 2009. Common ravens (*Corvus corax*) nesting on Alaska's North Slope Oil Fields. Final Report to CMI, Minerals Management Service OCS Study 2009-007, Alaska. 41pp.
Prowse, T.D., F.J. Wrona, J.D. Reist, J.E. Hobbie, L.M.J. Lévesque, and W.F. Vincent. 2006. General features of the Arctic relevant to climate change in freshwater ecosystems. Ambio 35:330–338.
Quakenbush, L., R. Suydam, T. Obritschkewitsch, and M. Deering. 2004. Breeding biology of Steller's eiders (*Polysticta stelleri*) near Barrow, Alaska, 1991–1999. Arctic 57:166–182.
Quakenbush, L.T., R.H. Day, B.A. Anderson, F.A. Pitelka, and B.J. McCaffery. 2002. Historical and present breeding season distribution of Steller's Eiders in Alaska. Western Birds 33:99–120.
Quakenbush, L., R. Suydam, K. Fluetsch, and T. Obritschkewitsch. 1998. Breeding habitat use by Steller's eiders near Barrow, Alaska, 1991-1996. Unpublished report prepared for U.S. Fish and Wildlife Service, Fairbanks, Alaska. 19pp.
Quakenbush, L.T., R.S. Suydam, K.M.Fluetsch, and C.L. Donaldson. 1995. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 1991-1994. Technical Report, U.S. Fish and Wildlife Service and North Slope Borough, Department of Wildlife Management.
Quinlan, R., M.V. Douglas, and J.P. Smol. 2005. Food web changes in arctic ecosystems related to climate warming. Global Change Biology 11:1381–1386.
Raveling, D.G. 1979. The annual cycle of body composition of Canada Geese with special reference to control of reproduction. Auk 96:234–252.
Rhymer, J.M., M.G. Fain, J.E. Austin, D.H. Johnson, and C. Krajewski. 2001. Mitochondrial phylogeography, subspecific taxonomy, and conservation genetics of sandhill cranes (*Grus canadensis*; Avers: Gruidae). Conservation Genetics 2:203-218

Rojek, N.A. 2008. Breeding biology of Steller's Eiders nesting near Barrow, Alaska, 2007. U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. Technical report. 45 pp.

Rojek, N. A. 2007. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 2006. U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. Technical Report. 53 pp.

Rojek, N.A. 2006. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 2005. Technical report for U.S. Fish & Wildlife Service, Fairbanks, Alaska. 61pp.

Roselaar, C. S. 1979. Fluctuaties in aantallen Krombedstrandlopers Calidris ferruginea. Watervogles 4:202–210.

Rosenberg, D. A., M. J. Petrula, D. Zwiefelhofer, T. Holmen, D. D. Hill, and J. L. Schamber. 2011. Seasonal movements and distribution of Pacific Steller's eiders (*Polysticta stelleri*). Final Report. Alaska Department of Fish and Game, Division of Wildlife Conservation, Anchorage, Alaska. 44 pp.

Rosenberg, D.H., M.J. Petrula, J.I. Schamber, D. Zwiefelhofer, T.E. Hollmén, and D.D. Hill. 2014. Seasonal Movements and Distribution of Steller's Eiders (*Polysticta stelleri*) Wintering at Kodiak Island, Alaska. Arctic 67:347-359.

Rosneft. 2020. Offshore Projects. rosneft.com/business/Upstream/Offshoreprojects/#a2.pdf.

Safine, D.E. 2015. Breeding ecology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2013-2014. Unpublished Report. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, Alaska.

Safine, D.E. 2013. Breeding ecology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2012. Unpublished Report. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, Alaska.

Safine, D. E. 2012. Technical report: Breeding ecology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2011. Endangered Species Branch, Fish and Wildlife Field Office, Fairbanks, Alaska.

Safine, D. E. 2011. Technical report: Breeding ecology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2008-2010. Endangered Species Branch, Fish and Wildlife Field Office, Fairbanks, Alaska.

Safine, D.E, M.S. Lindberg, K.H. Martin, S.L. Talbot, T.R. Swem, J.M. Pearce, N.C. Stellrecht, G.K. Sage, A.E. Riddle, K. Fales, and T.E. Hollmén. 2020. Use of Genetic Mark−recapture to Estimate Breeding Site Fidelity and Philopatry in a Threatened Sea Duck Population, Alaska-breeding Steller's Eiders. Endangered Species Research 41:349–360.

Schindler, D.W., and J.P. Smol. 2006. Cumulative effects of climate warming and other human activities on freshwaters of arctic and subarctic North America. Ambio 35:160–168.

Seamans, M.E. 2022. Status and Harvests of Sandhill Cranes: Mid-Continent, Rocky Mountain, Lower Colorado River Valley, and Eastern Populations. Administrative Report, U.S. Fish and Wildlife Service, Lakewood, Colorado. 17pp + tables and figures.

Sexson, M.G., J.M. Pearce, and M.R. Petersen. 2014. Spatiotemporal distribution and migratory patterns of spectacled eiders. BOEM 2014-665. Bureau of Ocean Energy Management, Alaska Outer Continental Shelf Region, Anchorage, Alaska.

Sharp, D.E., H.M. Hands, J.A. Dubovsky, and J.E. Cornely. 2010. Summary of sandhill crane hunting seasons in Kansas, 1993-2007. Pages 31-39 in B.K. Hartup, editor. Proceedings of the eleventh North American crane workshop. North American Crane Working Group, Laurel, Maryland, USA.

Smith, L., L. Byrne, C. Johnson, and A. Stickney. 1994. Wildlife studies on the Colville River Delta, Alaska, 1993. Unpublished report prepared for ARCO Alaska, Inc., Anchorage,

Alaska.
58pp.
Smith, L.C., Y. Sheng, G.M. MacDonald, and L.D. Hinzman. 2005. Disappearing Arctic lakes. Science 308:1429.
Smol, J.P. and M.S.V. Douglas. 2007. Crossing the final ecological threshold in high Arctic ponds. Proceedings of the National Academy of Sciences 104:12395–12397.
Smol, J.P., A.P. Wolfe, H.J.B. Birks, M.S.V. Douglas, V.J. Jones, A. Korhola, R. Pienitzi, K. Rühland, S. Sorvari, D. Antoniades, S.J. Brooks, M.A. Fallu, M. Hughes, B.E. Keatley, T.E. Laing, N. Michelutti, L. Nazarova, M. Nyman, A.M. Patterson, B. Perren, R. Quinlan, M. Rautio, E. Saulier-Talbot, S. Siitonen, N. Solovieva, and J. Weckström. 2005. Climate-driven regime shifts in the biological communities of arctic lakes. Proceedings of the National Academy of Science 102:4397–4402.
Solovyeva, D.V., and V. Kokhanova. 2017. Spectacled eider research in the Chaun-Delta, West Chukotka, Russia, 2016. Magadan, Russia.
Solovyeva, D., and G. Solovyev. 2013. Spectacled eider research in the Chaun-Delta, West Chukotka, Russia, 2013. Unpublished Report. Magadan, Russia.
Solovyeva, D.V., and L.A. Zelenskaya. 2016. Changes in the species composition and number of gulls in tundra colonies in the western Chukotka over the last 40 years. Biology Bulletin 43:844-850.
Solovyeva, D.V., S.L. Vartanyan, M. Frederiksen, and A.D. Fox. 2018. Changes in nesting success and breeding abundance of Spectacled Eiders *Somateria fischeri* in the Chaun Delta, Chukotka, Russia, 2003–2016. Polar Biology 41:743–751.
Stabeno, P.J., N.B. Kachel, S.E. Moore, J.M. Napp, M. Sigler, A. Yamaguchi, and A.N. Zerbini. 2012. Comparison of warm and cold years on the southeastern Bering Sea shelf and some implications for the ecosystem. Deep-Sea Research Part II: Topical Studies in Oceanography 65–70:31–45.
Stehn, T. 2002a. Whooping Crane Recovery Activities, September 2001 – February 2002. Accessed February 15, 2023. Accessed at: https://www.nacwg.org/wcra_sep_feb_2002.pdf.
Stehn, T. 2002b. Whooping Crane Recovery Activities, March – August 2002. Accessed February 15, 2023. Accessed at: https://www.nacwg.org/wcra_mar_aug_2002.pdf.
Stehn, T.V., and F. Prieto. 2010. Changes in Winter Whooping Crane Territories and Range 1950-2006. North American Crane Workshop Proceedings. 145.
Stehn, R. A., and R. Platte. 2009. Steller's eider distribution, abundance, and trend on the Arctic Coastal Plain, Alaska, 1989–2008. Unpublished report for USFWS, Anchorage, Alaska.
Stehn, T.V., and T. Wassenich. 2008. Whooping Crane Collisions with Power Lines: an Issue Paper. North American Crane Workshop Proceedings. 203. http://digitalcommons.unl.edu/nacwgproc/203
Stehn, R. A., W. W. Larned, and R. M. Platte. 2013. Analysis of aerial survey indices monitoring waterbird populations of the Arctic Coastal Plain, Alaska, 1986-2012. USFWS, Migratory Bird Management, Fairbanks, Alaska. Unpublished report.
Stehn, R., R. Platte, W. Larned, J. Fischer, and T. Bowman. 2006. Status and trend of spectacled eider populations in Alaska, 2006. Unpublished Report. U.S. Fish and Wildlife Service, Office of Migratory Bird Management, Anchorage, Alaska.
Stehn, R. A., C. P. Dau, B. Conant, and W. I. Butler Jr. 1993. Decline of Spectacled Eiders Nesting in Western Alaska. Arctic 46:264–277.
Summers, R. W. 1986. Breeding production of dark-bellied brant geese Branta bernicla bernicla in relation to lemming cycles. Bird Study 33:105–108.
Tacha, T.C., S.A. Nesbitt, and P.A. Vohs. 1992. Sandhill crane. In The Birds of North America, no. 31, ed. A. Poole, P. Stettenheim, and F. Gill, 1-24. Philadelphia and Washington DC: Academy of Natural Sciences and American Ornithologists Union.

Taylor, E.J. 1986. Foods and foraging ecology of oldsquaws (*Clangula hyemalis*) on the Arctic coastal plain of Alaska. M.S. Thesis, University of Alaska - Fairbanks.

TERA (Troy Ecological Research Associates). 2002. Spectacled eider movements in the Beaufort Sea: Distribution and timing of use. Report for BP Alaska Inc., Anchorage, Alaska and Bureau of Land Management, Fairbanks, Alaska. 17 pp.

Terenzi, J., M.T. Jorgenson, and C.R. Ely. 2014. Storm-surge flooding on the Yukon-Kuskokwim Delta, Alaska. Arctic 67:360–374.

Thompson, B. C., and R. R. George. 1987. Minimizing conflicts between migratory bird hunters and whooping cranes in Texas. Pages 56-68 in J. C. Lewis and J. W. Ziewitz, eds. Proceedings 1985 Crane Workshop. Platte River Whooping Crane Habitat Maintenance Trust and USFWS, Grand Island, Nebraska.

Trost, R.E. and M.S. Drut. 2002. 2002 Pacific Flyway Data Book. U.S. Fish and Wildlife Service. July 15, 2002. Portland, Oregon. 145 pp.

Trost, R.E. and M.S. Drut. 2001. 2001 Pacific Flyway Data Book. U.S. Fish and Wildlife Service. July 13, 2001. Portland, Oregon.

Trust, K., K.T. Rummel, A.M. Scheuhammer, I.L. Brisbin, Jr., MG Hooper. 2000. Contaminant exposure and biomarker responses in spectacled eiders (Somateria fischeri) from St. Lawrence Island, Alaska. Arch. Environ. Contam. Toxicol. 38:107-113.

Trust, K.A., J.F. Cochrane, and J.H. Stout. 1997. Environmental contaminants in three eider species from Alaska and Arctic Russia. Technical Report WAES-TR-97-03. U.S. Fish and Wildlife Service, Anchorage, Alaska. 44 pp.

Urbanek, R.P., S.E. Zimorski, A.M. Fasoli, and E.V. Szyszkoski. 2010. Nest desertion in a reintroduced population of whooping cranes. Proceedings of the North American Crane Workshop 11:133-141.

U.S. Fish and Wildlife Service (USFWS). 2021a. Intra-service Biological Opinion for Hunting Regulations for the 2021 Spring/Summer Harvest. U.S. Fish and Wildlife Service, Southern Alaska Fish and Wildlife Field Office, Anchorage, AK.

U.S. Fish and Wildlife Service (USFWS). 2021b. Revised Recovery Plan for the Alaska-breeding Population of Steller's Eider (*Polysticta stelleri*). December 2021. Northern Alaska Fish and Wildlife Field Office, Fairbanks, Alaska. 23pp.

U.S. Fish and Wildlife Service (USFWS). 2021c. Spectacled Eider (*Somateria fischeri*) 5-Year Review: Summary and Evaluation. August 2021. U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska.

U.S. Fish and Wildlife Service (USFWS). 2021d. Quivira National Wildlife Refuge, Hunting and Fishing Information.

U.S. Fish and Wildlife Service (USFWS). 2019. Status Assessment of the Alaska-breeding Population of Steller's Eiders. Version 1. March 2019. Fairbanks Fish and Wildlife Field Office.

U.S. Fish and Wildlife Service (USFWS). 2010. Intra-agency biological assessment for proposed 2010 Alaska migratory bird spring/summer subsistence hunt for threatened species: Spectacled eider (*Somateria fischeri*) and Steller's eiders (*Polysticta stelleri*). Unpublished report, Division of Migratory Bird Management.

U.S. Fish and Wildlife Service. 2002. Steller's Eider Recovery Plan. Fairbanks, Alaska. 27pp.

U.S. Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants: threatened status for the Alaska- breeding population of the Steller's eider. Final Rule. Published 11 July 1997 by the USFWS. Federal Register 62:31748–31757.

U.S. Fish and Wildlife Service. 1994. Whooping Crane Recovery Plan. Albuquerque, New Mexico, 92 pp.

U.S. Fish and Wildlife Service. 1996. Spectacled Eider Recovery Plan. Anchorage, Alaska. 157 pp.

U.S. Geological Survey. 2006. Biological response to ecological change along the Arctic Coastal Plain. Progress Report, August 2006, Alaska Science Center, Anchorage, U.S. Geological Survey. 10pp.
Walkinshaw, L.H. 1949. The Sandhill Cranes. Cranbrook Institute of Science. Bloomfield Hills, MI.
Walkinshaw, L.H. 1965. Attentiveness of cranes at their nests. Auk 82:465-476.
Walkinshaw, L.H. 1973. Cranes of the world. Winchester Press, New York. 370 pp.
Warnock, N., and D. Troy. 1992. Distribution and abundance of spectacled eiders at Prudhoe Bay, Alaska: 1991. Unpublished report prepared for BP Exploration (Alaska) Inc., Environmental and Regulatory Affairs Department, Anchorage, Alaska, by Troy Ecological Research Associates (TERA), Anchorage, Alaska. 20 pp.
Wentworth, C. 2004. Subsistence migratory bird harvest surveys: Yukon-Kuskokwim Delta, 1993– 2002; Bristol Bay, 1995–2001 (draft). U.S. Fish and Wildlife Service. Anchorage, Alaska.
Whooping Crane Committee. 2006. Aransas-Wood Buffalo Population Whooping Crane Contingency Plan.
Wilk, R.J., K.I. Wilk, R.C. Kuntz, II. 1986. Abundance, age composition and observations of emperor geese in Cinder lagoon, Alaska Peninsula, 17 September–10 October 1986. Unpublished report. U.S. Fish and Wildlife Service, King Salmon, Alaska. 41 pp.
Woodby, D.A., and G.J. Divoky. 1982. Spring migration of eiders and other waterbirds at Point Barrow, Alaska. Arctic 35: 403–410.

APPENDIX A. SPECIES ASSESSMENTS

REGION 1

No migratory bird hunting seasons are authorized for the Commonwealth of the Northern Mariana Islands, Guam, and other Pacific possessions. Therefore, no listed species in those areas will be affected by the proposed action.

Akiapolaau (*Hemignathm munroi*) [E]

The akiapolaau is a medium-sized, stocky, short-tailed, insectivorous, Hawaiian honeycreeper endemic to the Island of Hawaii. It primarily inhabits montane mesic and wet forests dominated by koa and ohia or subalpine dry forests dominated by mamane and naio; it has recently been found in young koa plantations. Breeding and molting occur mainly from February to July, but akiapolaau can be found breeding or molting during any month of the year. The majority of nests have been found in the leafy, terminal branches of tall ohia trees. Akiapolaau primarily forage on insects found on mature trees. They use their beak to probe crevices and insect borings or to locate and extract prey in a manner similar to a woodpecker.

In the unlikely event that hunting under the proposed regulations does occur in areas occupied by akiapolaau it is unlikely that they would be mistaken for a mourning dove (*Zenaida macroura*) due to significant differences in size, shape, behavior, and flight pattern. Falconry is not allowed on Hawaii and therefore would have no effect on this species. Because akiapolaau nest high up in trees they are unlikely to be adversely affected by the temporary presence of migratory game bird hunters.

Effect Determination: Not likely to adversely affect.

Hawaii Creeper (*Oreomystis mand*) [E]

The Hawaii creeper is a small insectivorous Hawaiian honeycreeper which is most common in mesic and wet forests above 5,000 feet in elevation. Its distribution is limited to 4 populations on the island of Hawaii. It is predominantly olive green on the back and dull greenish-buff below, with a white chin and throat. Nests of Hawaii creepers have been found from January to August, but peak breeding occurs from February to May, and molt occurs from May to August. Hawaii creepers generally build cup nests at mid-canopy at about 43 feet (range 9 to 79 feet) in height and about 5 feet (range 0 to 16 feet) from the main bole of the tree. Most (86 percent) are open cup nests but a few (14 percent) are cavity or pseudo-cavity nests. The Hawaii creeper

generally feeds on insects, spiders, and invertebrates that are gleaned from the trunks and branches of mature trees.

Mourning doves (*Zenaida macroura*), the only legally hunted migratory game bird in the State of Hawaii, are not likely to inhabit the undisturbed forests that the Hawaii creeper prefers. In the unlikely event that hunting under the proposed regulations does occur in areas occupied by Hawaii creepers it is unlikely that they would be mistaken for a mourning dove due to significant differences in size, shape, behavior, and flight pattern. Falconry is not allowed on Hawaii, and therefore, would have no effect on this species. Because Hawaii creepers nest high up in trees they are unlikely to experience significant disturbance to their behavior the temporary presence of migratory game bird hunters or their dogs.

Effect Determination: Not likely to adversely affect.

Hawaiian Goose/Nene (*Branta sandvicensis*) [E]

The nene is a medium-sized, grey-brown goose with a black face, head and nape of neck, buff cheeks, a pale beige neck with deep furrows, and sides that appear barred due to dark feathers with light edging. Nene historically utilized lowland grasslands, shrublands and dry forest and montane shrubland and dry forest. Their present distribution has been highly influenced by the location of release sites of captive-bred birds. Nene currently inhabit elevations ranging from sea level to 2,500 meters (8,000 feet) in coastal dune vegetation, normative grasslands (such as golf courses and pastures), sparsely vegetated low- and high-elevation lava flows, mid-elevation native and nonnative shrubland, early successional cinderfall, cinder deserts, native alpine grasslands and shrublands, and open native and nonnative alpine shrubland-woodland community interfaces (Banko et al. 1999). The breeding season of the nene is the reverse of other Branta species, being triggered by decreasing day length. Although eggs have been recorded as early as September and as late as April, the single nesting period generally extends from October through March.

Within the State of Hawaii mourning dove hunting is only permitted on the island of Hawaii (Hawaii Administrative Rules Title 13, Chapter 122). The mourning dove hunting season on the island of Hawaii (early-November to late-January) occurs during the peak nesting season of the Hawaiian goose (October through March/April). Nene may nest earlier or later depending on weather and loss of first clutch. Nene have the most extended breeding season of any wild goose.

Hunting for mourning doves on Hawaii is limited and is usually incidental (i.e., hunters that are after other game birds may flush a mourning dove and shoot it). On the Island of Hawaii, nene nesting areas and areas where mourning doves are likely to be hunted overlap in only two places: Kapapala Ranch and Puuwaawaa. Although nene nest at other areas on the Island of Hawaii that are open to hunting (e.g., the Saddle Road area, and Puu Anahulu), these areas are not likely to be inhabited by mourning doves due to their elevation or vegetation community.

A 1996 Biological Opinion (issued to the Federal Aid Program in Region 1 involving changes to a hunting program at the Kapapala Ranch Cooperative Game Management Area [GMA], on the island of Hawaii) addressed the potential effects on the Hawaiian goose from hunting dogs in the following way: "...The use of Kapapala Ranch GMA for game bird hunting places the hunters and their dogs in the vicinity of the nene that routinely use the area for loafing and foraging. Many of these nene are flightless and accompanied by similarly flightless goslings, making them particularly vulnerable to predation or disturbance by the hunters and their dogs."

The revised draft Recovery Plan (2004) for the nene states that feral and domestic dogs are a primary cause of death of nene on Kaua'i, and possibly have an impact on Hawaii (island) populations. Telfer (2003) [in the revised draft Recovery plan] reported that dogs have been a continual problem to nene on Kaua'i and found that 4 of 10 nene mortalities recorded there from July 1, 2001, to June 30, 2002, were attributed to predation by dogs. Dogs and mongooses are responsible for most of the known cases of predation on adult nene. Two mechanisms identified in the revised draft Recovery Plan to control effects of hunting dogs on Hawaiian goose include a recommendation for incorporating discussion of this problem in hunter education efforts, and a recommendation to consider enacting no hunting zones near important nesting or molting habitat.

To alleviate the risks to the nene at the Kapapala Ranch GMA, the State of Hawaii created a safety zone, making the majority of the sites used by the nene off-limits to hunting, and created educational materials to inform the hunters of the presence and vulnerability of the nene in the area. At the check station, hunters are given copies of a colored information sheet on nene and a map of the GMA, clearly showing the nene safety zone, where no hunting is allowed and where hunters must keep their dogs restrained. In addition, game bird hunting dogs are trained to point out wild birds, not to attack them. Threats to nene are more likely from feral dogs, pig hunting dogs, and vehicles on the highway that separates the Kau Desert from the Kapapala Ranch GMA. Lost hunting dogs must be found and accounted for before the hunters may leave the area. In addition, hunters are instructed to catch and turn in any lost dogs that they come across. There are additional terms and conditions to minimize take of the Hawaiian goose associated with the use of hunting dogs in the Service's 1996 Biological Opinion.

Since the initiation of the public game hunting program at the Kapapala Ranch GMA, there have been no known injuries or mortalities of nene that are attributable to the hunting program and no negative interactions between nene and the hunters and their dogs.

Although it is conceivable that mourning dove hunters could flush a nene from its nest, we conclude that this extremely unlikely to occur because of the limited amount of hunters that are in the field as a result of the mourning dove hunting season and the fact that there are only two places where nene nesting and mourning dove hunting are likely to overlap (one of which has restrictions that reduce the likelihood of interactions between hunters and nene). Accidental shooting of the Hawaiian goose is not anticipated because it is unlikely that a hunter will mistake a Hawaiian goose for a mourning dove due to differences in their size, shape, behavior, and flight pattern.

Effect Determination: Not likely to adversely affect.

Marbled Murrelet *(Brachyramphus marmoratus)* (Washington, Oregon, and California Populations) [T]

The marbled murrelet is a small diving seabird that breeds along the Pacific coast of North America from the Aleutian Archipelago and southwestern Alaska to central California. It forages almost exclusively in the nearshore marine environment, but flies inland to nest in mature conifer trees located in forest stands with old-growth forest characteristics. Marbled murrelet nesting occurs over an extended period from late-March to late-September. Marbled murrelets visit their inland sites throughout the year, aside from during their pre-basic molt period in fall and early winter.

The marbled murrelet occurs in several coastal and forest locations containing band-tailed pigeons (*Patagioenas fasciata*) and mourning doves. Hunters may mistake marbled murrelets for band-tailed pigeons due to their similar size and flight speed, however, silhouettes of the two species are different, and band-tailed pigeon hunting occurs at close range through the middle of the day resulting in even lower chances of confusion. Additionally, band-tailed pigeons are typically hunted in regenerating burned areas of forest or harvest units, often by walking or driving on logging roads. They may also be hunted near mineral springs. As such, they are either identified when perching on young trees or when descending toward a mineral spring, which greatly aids proper identification. The band-tailed pigeon hunting season is very short, and has low numbers of hunters. While marbled murrelets may be present in the forest sporadically outside the nesting season and therefore could be present in the forest during the

hunting season, population numbers are low in any given area, and the likelihood of low numbers of hunters encountering low numbers of marbled murrelets is very low.

In the southern part of the range, from Washington south, marbled murrelets are not known to forage in mixed seabird flocks. Pairs or small flocks of marbled murrelets appear to forage away from other species (Strachan et al. 1995), making accidental shooting due to misidentification less likely and reducing the chances of marbled murrelets responding to decoys representing other species. Hunters generally pursue larger ducks, but the smallest waterfowl they may shoot at is a bufflehead (*Bucephala albeola*) or a teal which can be almost twice as long as a marbled murrelet and has distinctive markings in both sexes. Buffleheads and some species of teal are shot less often than other ducks as they are a very small duck yielding little meat. In both cases, the wingspan is more than twice that of a marbled murrelet and the flap rate is noticeably different.

The presence of boats and/or the sound of shots in areas where marbled murrelets are foraging or resting may cause them to move away from such disturbances. Moving away can potentially affect the marbled murrelet. The time of year in which disturbance occurs is important -- especially during the pre-basic molt (as early as August to as late as November). At that time, marbled murrelets are flightless for part of this molt, and so "moving away" may not come without physical cost to the species. However, most salt-water hunters target puddle ducks (dabblers) along shores, while a subset target diving ducks. They pick locations, put out decoys, and wait. When pursuing dabbling ducks in salt water, hunters often choose areas of shallow water or tidal areas with emergent or upland vegetation. This type of habitat is not typically used by marbled murrelets. However, other hunters will set up in open water to pursue diving ducks. The degree of overlap between areas where marbled murrelets rest and forage in the nearshore environment and areas used by hunters is unknown. However, hunters that focus on saltwater diving ducks are less common than other duck hunters thereby reducing the risk of marbled murrelet exposure to hunting activities. There are seldom other birds around the hunters until the targeted species come in to decoys or fly over to view the decoys. Because marbled murrelets in Washington are not known to forage in mixed species flocks, therefore it is unlikely that they would forage near decoys. Once target species come within range, there is a short series of blasts (depending on number of hunters in boat) followed by a long period of waiting again. This makes it less likely that marbled murrelets will be exposed to disturbance from the hunters.

Effect Determination: Not likely to adversely affect.

Marbled Murrelet Critical Habitat
Effects of the Action on the Primary Constituent Elements of Designated Critical Habitat for the Marbled Murrelet

The action area includes approximately 3,698,100 ac (1,497,000 ha) of critical habitat for the marbled murrelt in Washington, Oregon, and California. The PCEs of marbled murrelet critical habitat are defined as "(1) individual trees with potential nesting platforms, and (2) forested areas within 0.5 mi (0.8 km) of individual trees with potential nesting platforms, and with a canopy height of at least one-half the site-potential tree height. This includes all such forest, regardless of contiguity." These PCEs will not be affected by implementation of the proposed hunting regulations because those regulations do not include a habitat alteration component, and hunters will not cause alteration of the above habitat conditions.

Effect Determination: No effect.

Northern Spotted Owl (Strix occidentalis caurina) [T]

The northern spotted owl is a dark brown, medium-sized owl with a barred tail and white spots on the head and breast. It inhabits mature and old growth forests from northwestern California to southwestern British Columbia. Northern spotted owls begin courtship activities in late February or March, and most eggs hatch in late April or May, and the majority of young fledge in June. The northern spotted owl occurs in several coastal locations within Region 1 where hunting for band-tailed pigeons and mourning doves may occur. The northern spotted owl's nocturnal habitats, its silhouette, size, and color make it highly unlikely that it would be mistaken for a band-tailed pigeon or a mourning dove. Noise associated with gunshots from legal hunting activities and hunters moving through the forest may alter feeding or sheltering of northern spotted owls because although the proposed action will occur outside of the owl breeding season, owls live in the forest throughout the year. However the amount of overlap of hunting areas and old-growth forest habitat is small. Band-tailed pigeons prefer young forest -- regenerating clear cuts for forage -- where they are most often hunted. Young forest stands may be used by northern spotted owls, and they may be in older forest stands adjacent to younger forest stands. However they are less likely to be in young forests than in older forests. For these reasons, hunting activities are not likely to adversely affect the northern spotted owl.

Effect Determination: Not likely to adversely affect.

Northern Spotted Owl Critical Habitat
Effects of the Action on the Primary Constituent Elements of Designated Critical Habitat for the Northern Spotted Owl

The action area includes approximately 9,557,969 ac (3,876,064 ha) of critical habitat for the northern spotted owl in Washington, Oregon, and California. The PCEs of northern spotted owl critical habitat are described as:

1) Forest types that may be in early-, mid-, or late-seral stages and that support the northern spotted owl across its geographical range. These forest types are recognized based on the dominant tree species occurring within the forest: (a) Sitka spruce; (b) western hemlock; (c) mixed conifer and mixed evergreen; (d) grand fir; (e) Pacific silver fir; (f) Douglas-fir; (g) white fir; (h) Shasta red fir; (i) redwood/Douglas-fir (in coastal California and southwestern Oregon); and (j) the moist end of the ponderosa pine coniferous forests zone at elevations up to approximately 3,000 ft (900 m) near the northern edge of the northern spotted owl’s range and up to approximately 6,000 ft (1,800 m) at the southern edge of its range.
2) Habitat that provides for nesting and roosting. In many cases the same habitat also provides for foraging (PCE 3). Nesting and roosting habitats provide structural features for nesting, protection from adverse weather conditions, and cover to reduce predation risks for adults and young. This PCE is found throughout the geographical range of the northern spotted owl, because stand structures at nest sites tend to vary little across the northern spotted owl’s range. These habitats must provide for the following habitat conditions: (a) sufficient foraging habitat to meet the home range needs of territorial pairs of northern spotted owls throughout the year; (b) stands for nesting and roosting that are generally characterized by (i) a moderate to high canopy cover (60 to over 80 percent), (ii) multilayered, multispecies canopies with large 20–30 in (51–76 cm) or greater dbh overstory trees, (iii) high basal area that is greater than 240 ft2/ac (55 m2/ha), (iv) high diversity of different diameters of trees, (v) a high incidence of large live

trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other evidence of decadence), (vi) large snags and large accumulations of fallen trees and other woody debris on the ground, and (vii) sufficient open space below the canopy for northern spotted owls to fly.

3) Habitat that provides for foraging, which varies widely across the northern spotted owl's range in response to variable ecological conditions and disturbance regimes that influence vegetation structure and prey species distributions. That variation is reflected in the PCEs for northern spotted owl foraging habitat for four recognized ecological zones within the geographical range of the northern spotted owl as described on pages 71901-71902 of the final rule designating northern spotted owl critical habitat (77 FR 71876).

Note that PCE 1 must occur in concert with PCE 2, 3, or 4.

The above PCEs will not be affected by implementation of the proposed hunting regulations, because the regulations do not include a habitat alteration component, and hunters would not alter the habitat conditions described above.

Effect Determination: No effect.

Palila (Loxioides bailleui) [E]

The palila is one of the larger Hawaiian honeycreepers with an overall length of 6 to 6.5 inches. The current range of the palila includes about 54 square miles or about 26 percent of the 212 square miles of mamane woodlands remaining on Mauna Kea on the island of Hawaii. Adult palila have a yellow head and breast, greenish wings and tail, and are gray dorsally and white ventrally. Adult females have less yellow on the nape and the lores are gray rather than black as in males. Nesting may begin in January or February, but palila usually start nesting from March to early May; egg laying continues through August or mid-September. The palila is an extreme food specialist, preferring unhardened mamane (Sophora chrysophylld) seeds in green pods or in pods that are just beginning to turn brown. Palila are dependent on the mamane and mamane/naio forests for all their needs.

Mourning doves, the only legally hunted migratory game bird in the State of Hawaii are not likely to inhabit the undisturbed high elevation forests that the palila prefers. In 25 years of observations (1980 to present), there have been only one possible detection (audio, not visual) of a mourning dove in the area. The detection is not confirmed and was in an area of very low palila population density due to the sparseness of mamane forest habitat. In the unlikely event

that hunting under the proposed regulations does occur in areas occupied by palila it is unlikely that they would be mistaken for a mourning dove due to significant differences in size, shape, behavior, and flight pattern. Falconry is not allowed on Hawaii and therefore would have no effect on this species. Because mourning dove hunting season is outside palila breeding season (see above), palila are unlikely to experience significant disturbance to their behavior from the temporary presence of migratory game bird hunters.

Effect Determination: Not likely to adversely affect.

Palila Critical Habitat

Critical habitat for the palila was designated in 1997 in mamane forests on the slopes of Mauna Kea Volcano between approximately 6,000 and 10,000 foot elevation. The proposed action will

have no effect on mamane forest habitat function or value and therefore will not affect palila critical habitat.

Effect Determination: No effect.

Short-tailed Albatross (Phoebastria (=Diomedea) albatrus)

The short-tailed albatross is the largest of the north Pacific albatrosses (adult wingspan can reach over 7 feet), with a prominent pink bill and white body. Immature birds are dark. The short-tailed albatross nests exclusively on a few small volcanic islands off the coast of Japan but are an occasional visitor to the waters off the Pacific coast of the U.S. from California to Alaska. Almost all short-tailed albatross sighting in the lower 48 States, which are very rare, have occurred out at sea. Therefore, it is extremely unlikely that migratory game bird hunting activities would occur in areas occupied by short-tailed albatross.

Effect Determination: No effect.

Streaked Horned Lark (Eremophila alpestris strigata) [T]

The streaked horned lark occurs on Columbia River islands where it is present year-round. For that reason, it could be present in the same areas as hunters if they are setting up on shore or on islands. But, typically waterfowl hunters in the Columbia River hunt from the water. Goose hunting typically occurs in agricultural fields with crops such as corn or pastures, and is not likely to overlap with streaked horned lark habitat in Washington. In Oregon, however, the streaked horned lark often occurs in agricultural fields. But when hunters select sites near water, they usually seek areas with thick vegetative cover, which is non-streaked horned lark habitat, for concealment. Hunting from suitable streaked horned lark habitat, such as on Columbia River islands and some shoreline areas with sparse vegetation, is infrequent and sporadic, and occurs outside the nesting season. Although hunting-related disturbance of streaked horned larks may occur, such potential disturbance outside the breeding season is not likely to rise to the level of an adverse effect.

Effect Determination: Upon listing not likely to adversely affect.

Streaked Horned Lark Critical Habitat

A section for streaked horned lark critical habitat should be inserted on page 121 of the biological opinion. The text of this section should indicate that a “no effect” determination is

warranted relative to the Primary Constituent Elements (PCEs) of streaked horned lark critical habitat. The rationale for that finding is presented below.

Effects of the Action on the PCEs of Designated Critical Habitat for the Streaked Horned Lark

The action area includes 4,629 ac (1,873 ha) of critical habitat for the species in two units (3 and 4) and 16 subunits in Washington and Oregon. Unit 3 covers the Washington Coast and Columbia River Islands (Damon Point, Midway Beach, Shoalwater Spit, Leadbetter Point, Rice Island, Miller Sands, Pillar Rock/Jim Crow, Welch Island, Tenasillahe Island, Whites/Brown, Wallace Island, Crims Island, and Sandy Island subunits). Unit 4 covers the Willamette Valley (Baskett Slough NWR, Ankeny NWR, and William L. Finley NWR subunits). The PCEs of streaked horned lark critical habitat are defined as “areas having a minimum of 16 percent bare

ground that have sparse, low-stature vegetation composed primarily of grasses and forbs less than 13 in (33 cm) in height found in: (1) large 300 ac (120 ha), flat (0-5 percent slope) areas within a landscape context that provides visual access to open areas such as open water or fields, or (2) areas smaller than described in (1), but that provide visual access to open areas such as open water or fields." These PCEs would not be affected by implementation of the proposed hunting regulations, because the regulations do not include a habitat alteration component, and hunters using these areas would not alter the habitat characteristics of the PCEs described above.

Effect Determination: No effect.

Western Snowy Plover (Charadrius nivosus nivosus) [T]

The western snowy plover, a small shorebird, breeds primarily on coastal beaches from Washington to Baja California and winters in coastal areas from southern Washington to Central America. It is pale gray-brown above and white below, with a white hind-neck collar and dark lateral breast patches, forehead bar, and eye patches.

The western snowy plover nesting season extends from early March through late September. While some snowy plovers remain in their coastal breeding areas year-round, others migrate south or north for winter. Most plovers that nest inland migrate to the coast for the winter. The departure from inland nesting areas begins by early July and is completed, except for stragglers, by mid-October.

Due to its small size, silhouette and flight pattern it is extremely unlikely that the western snowy plover would be confused with any migratory game bird species. Disturbance of nesting plovers is not anticipated under the proposed action because hunting seasons will not overlap with the nesting season.

The recovery plan for this species notes that sport of training falcons for hunting could result in losses of snowy plovers when it introduces predators to snowy plover habitats. However, because the proposed action includes a conservation measure that prohibits falconry activities in the vicinity of nesting colonies or nesting concentrations of Federally listed threatened and endangered shorebirds, the introduction of predators due to legal falconry practices will not occur.

Effect Determination: No effect.

Yellow-billed Cuckoo (Coccyzus americanus) [T]

The yellow-billed cuckoo is a medium sized bird that occurs in riparian habitats where waterfowl hunting may occur. This species has a slender, long-tailed profile, with a fairly stout and slightly down-curved bill. The tail feathers are boldly patterned with black and white below. The breeding season for the yellow-billed cuckoo generally begins with pair formation in mid-June and lasts until mid-August. Yellow-billed cuckoos annually migrate to wintering grounds in South America. Spring migration begins in late May and lasts until late June, and fall migration begins in late August and lasts until mid-September.

The discussion in the final listing rule (79 FR 59992) references that the species no longer

breeds in western Canada and the northwestern continental United States (Washington, Oregon, and Montana), that the species occasionally occurs within historic breeding areas in OR, WA, and British Columbia, and that available data suggest that if yellow-billed cuckoos still breed in Washington, the numbers are extremely low, with pairs numbering in the single digits.

For Washington Only: The chances of negative interactions as a result of migratory bird hunting are so low as to be extremely unlikely. There is no proposed critical habitat for the yellow-billed cuckoo in Washington.

We do not anticipate adverse effects to this species as a result of the proposed action because it is not present in the action area during the migratory game bird hunting season.

Effect Determination: No effect.

Oregon spotted frog*(Proposed critical habitat); bull trout*; Pinus albicaulis [C]; Artemisia campestris ssp. borealis var. wormskioldii (candidate); Arenaria paludicola; Castilleja levisecta; Eriogonum codium*; Hackelia venusta; Howellia aquatilis; Lomatium bradshawii; Lupinus sulphureus ssp. kincaidii*; Physaria douglasii ssp. tuplashensis*; Sidalcea nelsoniana; Sidalcea oregana var. calva; Silene spaldingii; Spiranthes diluvialis; Oregon silverspot butterfly; Taylor's checkerspot butterfly*; Canada lynx*; Columbian white-tailed deer (Columbia River DPS); Fisher [PT]; Gray wolf (western 2 thirds of State); grizzly bear; Roy Prairie pocket gopher; Olympia pocket gopher*; Tenino pocket gopher*; Yelm pocket gopher*; pygmy rabbit; woodland caribou*; and the Washington ground squirrel [C]. A number of these species have designated critical habitat (marked by an asterisk after their name).

These species would not be affected by the proposed action due to a lack of exposure to hunting-related activities.

Effect Determination: No effect.

REGION 2

Attwater's' prairie-chicken (Tympanuchus cupido attwateri) [E]

Appearance is slightly similar in color and size to some waterfowl and flight patterns might be briefly confused with legally-hunted migratory species. In general, prairie-chickens are an upland species seldom found in areas where ducks are being hunted. While prairie-chickens

are occasionally found in harvested rice fields where geese are commonly hunted, coloration and flight patterns of prairie-chickens are quite different from geese. One prairie-chicken was shot by a waterfowl hunter near Sealy, Texas, in 1990. To date, this is the only such incident of which Region 2 has knowledge, and the circumstances surrounding this event make it unlikely that it would happen in the future.

Effect Determination: Not likely to adversely affect

Black-capped vireo (Vireo atricapillus) [E]

Preferred habitat is scattered trees and numerous dense clumps of shrubs interspersed with

open areas. This small bird is not similar in appearance to any legally-hunted game bird.

Effect Determination: Not likely to adversely affect

California condor (Gymnogyps californianus) [E - Experimental nonessential]

This large bird is not similar in appearance or behavior to legally-hunted game birds. The proposed regulations do not allow the use of lead shot, therefore lead poisoning from eating game birds contaminated by lead shot is not of concern.

Effect Determination: Not likely to adversely affect

Golden-cheeked warbler (Dendroica chrysoparia) [E]

Inhabits oak-juniper woodlands. This small bird is unlikely to be mistaken for any of the game birds covered by the proposed regulations.

Effect Determination: Not likely to adversely affect

Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) [E – Northern DPS; T – Southern DPS]

Species of prairie grouse endemic to the southern and central high plains of the United States, commonly recognized for its feathered tarsi (legs), stout build, ground-dwelling habit, and lek mating behavior. Their plumage is characterized by a cryptic pattern of alternating brown and buff-colored barring. Males have long tufts of feathers on the sides of the neck, termed pinnae, which are erected during courtship displays. Pinnae are smaller and less prominent in females. Males also display brilliant yellow supraorbital eyecombs and dull reddish esophageal air sacs during courtship displays. Lesser prairie-chickens are dimorphic in size, with the females being smaller than the males. Adult body length varies from 38 to 41 centimeters (cm) (15 to 16 inches [in]), and adult body mass varies from 618 to 897 grams (g) (1.4 to 2.0 pounds [lbs]) for males and 517 to 772 g (1.1 to 1.7 lbs) for females.

Lesser prairie-chickens may be encountered by dove hunters. However, their size, color, and ground-dwelling behavior make them unlikely to be mistaken by dove hunters.

Effect Determination: Not likely to adversely affect

Masked bobwhite quail (Colinus virginianus ridgewayi) [E]

Inhabits upland desert areas where it would not be in contact with waterfowl hunters. The quail may be encountered by dove hunters at desert water holes. However, bobwhite quail are distinctive in their body features and flight characteristics such that it is unlikely that they would be mistaken by dove hunters.

Effect Determination: Not likely to adversely affect

Mexican spotted owl (Strix occidentalis lucida) [T]

Would not be in contact with waterfowl hunters, but occurs in several locations inhabited by mourning doves. The owls' nocturnal habits, silhouette, size, and color make it highly unlikely

that it would be mistaken for a dove.

Effect Determination: Not likely to adversely affect

Northern aplomado falcon (Falco femoralis septentrionalis) [E]

Inhabits savanna type areas, but may occasionally visit wetlands where migratory bird hunting could occur. Falcons are not similar in appearance to any legally-hunted game bird.

Effect Determination: Not likely to adversely affect

Piping plover (Charadrius melodus) [T]

Piping plovers infrequently use areas utilized by waterfowl hunters. Plovers have no similarity in appearance to any legally-hunted game bird.

Effect Determination: Not likely to adversely affect

Red-cockaded woodpecker (Picoides borealis) [E]

The secretive nature, small size, and complete lack of similarity between this woodpecker and any legally-hunted game bird makes it unlikely that it would be mistaken as such.

Effect Determination: Not likely to adversely affect

Southwestern willow flycatcher (Empidonax traillii extimis) [E]

This small bird frequents habitats where waterfowl hunting may occur, but it is not similar in appearance to any legally-hunted game bird.

Effect Determination: Not likely to adversely affect

Whooping crane (Grus Americana) [E]

Whooping cranes feed and roost in wetlands and upland grain fields where they associate with ducks, geese, and sandhill cranes. They winter on the central Texas Gulf Coast where they associate with ducks, snow geese, and occasionally sandhill cranes. Shooting has been a matter of concern for recovery of whooping cranes. Most shooting incidents involving whooping cranes have been associated with the hunting of look-alike species, such as snow geese and sandhill cranes.

In response to an illegal shooting in 2004, and to reduce the chance of shooting a whooping crane, the Central Flyway Council (CFC) has adopted the 2006 Aransas-Wood Buffalo Population Whooping Crane Contingency Plan. This document is a revision of the 2000-2001 Contingency Plan for Federal-State Cooperative Protection of Whooping Cranes with guidelines designed to achieve the following objectives:

1) To designate the appropriate response options and reporting requirements whenever whooping cranes are confirmed as sick, injured, or dead, or when they are healthy but in hazardous situations.
2) To inform and educate hunters as to the occurrence of whooping cranes in areas open

to sandhill crane and waterfowl hunting so as to minimize accidental shooting incidents.
3) To reduce the likelihood of illegal shooting of whooping cranes by poachers or vandals.
4) To reduce whooping crane use of sites deemed to be a disease or pollutant hazard.
5) To increase the opportunity to recover and rehabilitate wild whooping cranes found injured or sick and to help identify causes of death of whooping cranes.
6) To gain sighting information on presence of whooping cranes outside of traditional summer and winter areas.

The contingency plan is intended for guidance in those areas where the Aransas-Wood Buffalo Population of whooping cranes occur in the wild excluding their traditional summer and winter ranges. This includes Regions 2 and 6 of the Fish and Wildlife Service.

The only wild population of whooping cranes nests in Wood Buffalo National Park which is located within the provinces of Alberta and Northwest Territories, Canada. This population has traditionally wintered along the central Gulf Coast of Texas on and around Aransas NWR. However, in the last few years whooping cranes have been expanding their winter range in Texas, with small flocks recently wintering as far north as the Granger Lake area of central Texas.

During the winter of 2021-22, 543 whooping cranes were estimated in the primary survey area. Examination of the 77-year trend in whooping crane numbers shows an increase with occasional, periodic declines. The population remained stable from winter 2017-2018 to winter 2019-2020 but has grown over the last two years.

Aransas NWR allows hunting of white-tailed deer and feral hogs in portions of the Refuge not frequented by whooping cranes, but contains a provision that management may immediately close the entire refuge or any portion thereof to hunting, in the event of the appearance of whooping cranes in the hunt area [CFR50 §32.63]. Waterfowl, white-tailed deer, and feral hog hunting is permitted on the Matagorda Island Unit of Aransas NWR through an agreement with Texas Parks and Wildlife Department and on private lands, both being locations where whooping cranes occur throughout the winter. Closing of these lands due to the presence of whooping cranes has not been considered.

Effect Determination: Not likely to adversely affect

Yuma clapper rail (Rallus longirostris yumanensis) [E]

It is possible that this rail could be confused with legally-hunted rail species. However, no interest exists for hunting rails in the range of the Yuma clapper rail. There are no known losses of the species as a result of legally hunting game birds and none are anticipated.

Effect Determination: Not likely to adversely affect

REGION 3

Piping plover (Dendroica kirtlandii) [E]
Kirtland's warbler (Charadrius melodus) [E]

We do not anticipate any adverse effects from the proposed hunting regulations. The timing of migratory bird hunting is such that hunters are not in the breeding habitat during nesting so disturbance at this crucial time doesn't happen because of migratory bird hunting. And although these species may be migrating through areas being hunted for migratory birds, information we have suggests that the migratory bird hunting regulations have no affect (we have gathered information for years on shooting of non-target species and have no information suggesting any of these species are taken). Moreover, none of these species resemble any hunted migratory bird, and therefore it is unlikely that lawful hunting activities will adversely affect these listed species.

Effect Determination: No Effect.

Piping plover critical habitat

Designated critical habitat for the piping plover occurs within Region 3 in areas of Minnesota, Illinois, Indiana, Michigan, Ohio, and Wisconsin. Migratory hunting activities are not likely to occur within these designated areas as critical habitat is confined to the sandy beach areas along the shores of the Great Lakes and Pine and Curry Islands of Lake of the Woods. Thus, we conclude the proposed action will not affect piping plover critical habitat.

Effect Determination: No effect.

Whooping crane (Grus Americana) [E – Experimental Non-essential]

Whooping cranes found within Region 3 belong to a recently introduced population in Wisconsin. This population is classified as a nonessential experimental population, and for section 7 purposes, whooping cranes are considered threatened on National Wildlife Refuge and National Park Service lands and proposed on all other lands.

The main reintroduction release site for this whooping crane population is Necedah NWR in central Wisconsin. Other National Wildlife Refuges within Region 3 that are or may be utilized by whooping cranes in the summer or during the spring and fall migration include Horicon NWR and Fox River NWR in Wisconsin, Upper Mississippi NWR in Illinois and Wisconsin, and Muscatatuck NWR in Indiana. All of these Refuges also allow migratory game bird hunting, and thus, whooping cranes using these sites during that time may be exposed to disturbance and possible mortality from the proposed migratory game bird regulations.

According to the lead Field Office for whooping cranes in Region 3, seven whooping cranes have been shot in 2013 and 2014, and none in 2015. None of these illegal shootings has occurred on Refuges. Although some of the kills occurred during the migratory bird hunting season, they have not occurred during the legal hunting hours, such as shooting prior to sunrise. All of the illegal kills are believed to be intentional and unrelated to lawful migratory game bird hunting. Illegal killings are not believed to be a matter of mistaken identification as indicated by investigations by the OLE (for example, individuals who confess to knowing they

were shooting something they shouldn't, or claiming they thought it was an "albino" sandhill – and sandhills are not lawful to hunt on NWRs. For this reason, we do not conclude the illegal killings were mistaken identifications. Therefore, we continue to conclude that it is extremely unlikely that whoopers will be shot or injured by sportsmen who are pursuing migratory bird game per the proposed regulations.

Although incidental shooting or disturbance could occur, we conclude for the following reasons that the likelihood of either is low: 1) the small number of birds in the population; 2) the limited time period when these whooping cranes are exposed to threats from hunting; 3) the limited area to which this analysis applies (only those Refuge lands open to hunting); and 4) the lack of sandhill crane hunting seasons within the action area (Note, sandhill crane hunting will be permitted in NW Minnesota but there are few or no records of NEP whooping cranes in this area). Each of these risk factors contrasts greatly with the risks to which the natural wild flock of migratory whooping cranes is exposed. Therefore, we conclude that this risk is very low, and may be considered to be discountable.

Effect Determination: May Affect but Not likely to adversely affect.

REGION 4

Ivory-billed Woodpecker (Campephilus principalis) [E]

The rediscovery of the endangered Ivory-billed Woodpecker (IBWO) on Cache River NWR in Monroe County, east-central Arkansas, announced in April 2005, continues to represent the only confirmed occurrence of the species throughout its historical range in the southeastern US since the 1940s. Lack of additional confirmed reports in Arkansas and elsewhere suggest that the species is extirpated or extremely rare in all of its former range. Duck hunting is the most likely for of migratory game bird hunting to result in direct (e.g. accidental shooting) impacts to IBWO due to overlap in habitat use, frequent poor visibility, and the potential to mistake the species as waterfowl. We have no record of take of IBWO incidental to regulated activities associated with waterfowl or other migratory bird harvest. While activities authorized by the proposed regulations may affect IBWO through disturbance, the pileated woodpecker and other non-game bird species remain common and sustainable within areas of high public hunting pressure. This suggests that the potential indirect effects of migratory game bird hunting do not adversely affect the populations of other species occupying the same habitat. We conclude that the proposed action is unlikely to adversely affect the IBWO. The probability of the proposed regulations resulting in an adverse effect or in incidental take of IBWO is discountable. Though the accidental shooting of a single IBWO may be considered highly significant to the species, such an occurrence is extremely unlikely. As an extra precaution in the area of eastern Arkansas, where the only confirmed reports of IBWO exist, educational information is provided for hunters, which further diminishes the possibility for incidental take due to migratory game bird hunting.

Effect Determination: May Affect but not likely to adversely affect.

Audubon's crested caracara (Polyborus plancus audubonii) [T]

The caracara's size and appearance virtually eliminate the possibility of this species being accidentally shot while standing. In flight, however, caracaras can be confused by inexperienced hunters. We recommend where hunting occurs within the range of this species, that a hunter education program include information concerning this species.

Effect Determination: May Affect but not likely to adversely affect.

Cape Sable seaside sparrow (Ammodramus maritimus mirabilis) [E]

The small size and solitary habits of this sparrow, coupled with the fact that it does not resemble any species covered in the regulations, preclude the likelihood of incidental take. Critical habitat for the Cape Sable seaside sparrow has been designated in Collier, Miami-Dade, and Monroe Counties, Florida. This action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated.

Effect Determination: Not likely to adversely affect.

Everglade snail kite (Rostrhamus sociabilis plumbeus) [E]

The Recovery Plan points out possible pre-nesting disturbance problems posed by waterfowl hunters, however, further review by Region 4 determined that there was no overlap between waterfowl hunting and kite activity. Critical habitat for the Everglade snail kite has been designated in three conservation areas of the Everglades National Park and the Loxahatchee NWR, Florida. This action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated.

Effect Determination: May affect but not likely to adversely affect.

Florida grasshopper sparrow (Ammodramus savannarum floridanus) [E]

This small brown upland sparrow would not be confused with any species covered by the regulations.

Effect Determination: May affect but not likely to adversely affect.

Florida scrub jay (Aphelocoma coerulescens) [T]

The scrub jay's unique flight patterns and territorial nature make incidental take of this species unlikely.

Effect Determination: May affect but not likely to adversely affect.

Kirtland’s Warbler (Dendroica kirtlandii) [E]

The Kirtland's warbler is a songbird that nests in young jack pine stands. This warbler is rare and occurs in the Southeast Region only during migration. The small size of this bird and other appearance characteristics make the probability of incidental take unlikely.

Effect Determination: May affect but not likely to adversely affect.

Mississippi sandhill crane (Grus canadensis pulla) [E]

This non-migratory population of sandhill cranes is confined to a fairly small section of Jackson County, Mississippi. As they would not be mistaken for any legally hunted migratory birds in that area, no adverse effect is anticipated. Critical habitat for the Mississippi sandhill crane has been designated on the Mississippi Sandhill Crane NWR in Jackson County, Mississippi. This action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated.

Effect Determination: Not likely to adversely affect.

Piping plover (Charadrius melodus) [E]

Any encounters with plovers would occur on the wintering ground, however, most are sandy beaches where little migratory bird hunting would be expected to occur. At least in a few areas in the Southeast Region however, piping plovers could winter in habitats in close proximity to hunting activities. One Field Office noted that when using sandy, sound side habitats along islands and shoals, piping plovers could be in close proximity to duck blinds (especially in Pamlico and Core Sounds in North Carolina). The small sandy-colored plovers do not resemble any species covered by these regulations, so incidental take is not anticipated. Critical habitat for the Great Lakes piping plover has been designated in the Southeast Region along the Gulf Coast in Louisiana, Mississippi, Alabama, and Florida, and along the Atlantic coast in Florida, Georgia, South Carolina, and North Carolina. This action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated.

Effect Determination: May affect but not likely to adversely affect.

Puerto Rican broad-winged hawk (Buteoplatypterm brunnescens) [E]

This raptor is restricted to montane, primarily government-owned forests in Puerto Rico, where hunting is not allowed. The bird is a rare, small, overall dark chocolate-colored hawk. Although this hawk occurs in habitat that is also used by the scaly-naped pigeon (Patagioenas squamosa), a legally hunted species, its silhouette and rarity make it unlikely that they would be incidentally taken during lawful hunting activities outside of protected areas.

Effect Determination: Not likely to adversely affect.

Puerto Rican nightjar (Caprimulgus noctitherus) [E]

The secretive nature, drab appearance, and nocturnal feeding habits of the Puerto Rican nightjar make incidental take during lawful hunting extremely unlikely

Effect Determination: Not likely to adversely affect.

Puerto Rican parrot (Amazona vittata) [E]

Deliberate shooting for food and to protect crops was a significant mortality factor for this species during the last century. At present, there is no correlation with the proposed regulations,

as the species is extremely rare. The two existing wild parrot populations are in protected lands: El Yunque National Forest and the Rio Abajo Commonwealth Forest. Although the parrots may move outside protected areas, their coloration, vocalization, and flight behavior, make it unlikely that hunters would mistakenly shoot the species during lawful hunting activities outside of protected areas.

Effect Determination: May affect but not likely to adversely affect.

Puerto Rican Plain pigeon (Columba inornata wetmorei) [E]

Poorly regulated hunting contributed substantially to the decline of this species, and some pigeons are still being shot either deliberately or when mistaken for the legally hunted scaly-naped pigeon (Patagioenas squamosa), which is similar in appearance to the plain pigeon. To preclude shooting losses, the Puerto Rico Department of Natural and Environmental Resources established closed areas in Puerto Rico consisting of Cidra Municipality and portions of Aguas Buenas, Caguas, Cayey, and Comerio Municipalities. However, in recent years, plain pigeons have been shifting westward outside these closed areas. Accidental shooting of plain pigeons is possible, as hunting activities are conducted in or adjacent to known occurrences of the species. However, the proposed change to the existing guidelines for the establishment of zone and split seasons for ducks and mourning doves hunting may affect but are not likely to adversely affect the Puerto Rican plain pigeon, because this species is rarely found in areas where duck and mourning dove lawful hunting are generally practiced.

Effect Determination: May affect but not likely to adversely affect.

Puerto Rican sharp-shinned hawk (Accipiter striatus venator) [E]

This raptor is restricted to montane, primarily government-owned forest in Puerto Rico, where hunting is not allowed. The adults are small, dark slate grey on top and heavily barred rufous underneath. Immature birds are brown above and heavily streaked below. The silhouette, habitat, and rarity of this species make it unlikely that they would be incidentally taken during lawful hunting.

Effect Determination: May affect but not likely to adversely affect.

Red-cockaded woodpecker (Picoides borealis) [E]

The secretive nature, small size, and complete lack of similarity between this woodpecker and any hunted migratory species preclude adverse effects from migratory bird hunting regulations.

Effect Determination: May affect but not likely to adversely affect.

Red Knot (Calidris canutus rufa) [T]

The Red Knot is a migrant and winter resident along the Atlantic and Gulf coasts during hunting seasons for Rallidae and Scolopacidae species. Inexperienced hunters could possibly mistake Red knots for rails or snipe in coastal bays and marshes. We have no reports of red knot being hunting mortality and we conclude the probability is discountable.

Effect Determination: May affect but not likely to adversely affect.

Roseate tern (Sterna dougallii) [T – FL, PR, VI Western Hemisphere and adjacent oceans]

The silhouette, coastal habitat, feeding habits and flight patterns of the roseate tern make the likelihood of incidental take highly unlikely.

Effect Determination: May affect but not likely to adversely affect.

Wood stork (Mycteria americand) [E]

Although migratory bird hunting occurs within States where the wood stork is listed, they are not likely to be incidentally taken because they do not resemble hunted species, and their habits and behaviors put them at little risk of being encountered by sportsmen.

Effect Determination: May affect but not likely to adversely affect.

Yellow-shouldered blackbird (Agelaius xanthomus) [E]

Yellow-shouldered blackbirds have distinct coloration, morphology, and habitat preferences that make the possibility of incidental take very unlikely. Critical habitat for the yellow-shouldered blackbird has been designated in Puerto Rico and nearby Mona Island. This action would not affect that area and no destruction or adverse modification of that critical habitat is anticipated.

Effect Determination: May affect but not likely to adversely affect.

Whooping Crane (Grus americana) [E -EXPN]

Whooping cranes from three non-essential experimental populations occur in Region 4: 1) a non-migratory flock on Kissimmee Prairie area of central Florida; 2) an eastern migratory flock with breeding habitat in central Wisconsin and wintering habitat in west-central Florida; and 3) a non-migratory flock on the White Lake Wetlands Conservation Area in Vermilion Parish, Louisiana. It is also possible for individuals from the WHCR population that winters in and around Aransas NWR in Texas to occasionally stray from normal migratory pathways into Region 4. While accidental shooting of WHCRs during lawful hunting activities are possible and have occurred infrequently in past years, we have no new reports of such incidental shootings in Region 4 since the last Regional report. The likelihood of WHCR take associated with regulated hunting seasons remains extremely low as to be discountable. Death or injury of WHCRs in association with migratory game bird hunting is infrequent, and measures such as the cooperative Federal-State plan are in place to protect them

Effect Determination: May affect but not likely to adversely affect.

REGION 5
Piping plover (Charadrius melodus) [T] and roseate tern (Sterna douglalli) [E]

No effect. They have migrated south prior to any waterfowl seasons.
Critical habitat for the Great Lakes piping plover has been designated for breeding habitat along the shorelines of the Great Lakes in New York, Minnesota, Illinois, Indiana, Michigan, Ohio, Pennsylvania, and Wisconsin. Critical habitat for wintering piping plovers has been designated along the Gulf Coast in Texas, Louisiana, Alabama, and Florida. To date, no breeding habitat for the Atlantic piping plover or roseate tern has been proposed for Critical Habitat. This action does not affect any of these areas and no destruction or adverse modification of critical habitat is anticipated.

Effect Determination: May affect but not likely to adversely affect.

Red-cockaded woodpecker (Picoides borealis) [E]

The secretive nature, small size, and complete lack of similarity between this woodpecker and any hunted migratory species preclude adverse effects from migratory bird hunting regulations. Further, because known occurrences of this species in Virginia are limited to lands where migratory bird hunting is not allowed, and any birds that leave that area differ in appearance from legal game, this action is not likely to adversely affect red-cockaded woodpeckers.

Effect Determination: May affect but not likely to adversely affect.

Red Knot (Calidris canutus rufa) [T]

On December 11, 2014, the Service published the final rule listing the rufa red knot as a threatened species throughout its range; the rule became effective on January 12, 2015 (79 FR 73706). The range includes: Argentina, Aruba, Bahamas, Barbados, Belize, Brazil, British Virgin Islands, Canada, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, El Salvador, France, Guatemala, Guyana, Haiti, Jamaica, Mexico, Panama, Paraguay, Suriname, Trinidad, Tobago, Uruguay, Venezuela, and the United States (AL, AR, CT, CO, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, NE, NC, ND, NH, NJ, NY,
OH, OK, PA, RI, SC, SD, TN, TX, VA, VT, WI, WV, WY, Puerto Rico, and US Virgin Islands). Interior states are included in the range because rufa red knots have been documented in those states during migration.

Documents pertaining to the listing rulemaking can be found at the following link: http://www.fws.gov/northeast/redknot/.

The Service is developing a critical habitat determination for the red knot; a publication date for this determination has not yet been set.

Effect Determination: May affect but not likely to adversely affect.

Canada Lynx (Lynx canadensis) [E]

The secretive nature and complete lack of similarity between the Canada lynx and any hunted migratory species preclude adverse effects from migratory bird hunting regulations. Although

seven lynx have been illegally shot in Maine since 2000, there is no information to support a connection between the proposed action and the shooting of lynx. Hunters and trappers are informed that shooting a lynx in Maine is illegal under State and Federal regulations.

Effect Determination: May affect but not likely to adversely affect.

REGION 6
Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) [E – Northern DPS; T – Southern DPS]

Species of prairie grouse endemic to the southern and central high plains of the United States, commonly recognized for its feathered tarsi (legs), stout build, ground-dwelling habit, and lek mating behavior. Their plumage is characterized by a cryptic pattern of alternating brown and buff-colored barring. Males have long tufts of feathers on the sides of the neck, termed pinnae, which are erected during courtship displays. Pinnae are smaller and less prominent in females. Males also display brilliant yellow supraorbital eyecombs and dull reddish esophageal air sacs during courtship displays. Lesser prairie-chickens are dimorphic in size, with the females being smaller than the males. Adult body length varies from 38 to 41 centimeters (cm) (15 to 16 inches [in]), and adult body mass varies from 618 to 897 grams (g) (1.4 to 2.0 pounds [lbs]) for males and 517 to 772 g (1.1 to 1.7 lbs) for females.

Lesser prairie-chickens may be encountered by dove hunters. However, their size, color, and ground-dwelling behavior make them unlikely to be mistaken by dove hunters.

Effect Determination: Not likely to adversely affect

Piping plover (Charadrius melodus) [T], Mexican spotted owl (Strix occidentalis lucida) [T], greater sage-grouse (Centrocercus urophasianus) [C]

It is highly unlikely that these listed birds would be adversely affected by implementation of the proposed migratory game bird hunting regulations. It is unlikely that these species would be misidentified for any bird species covered by these regulations. Some losses of these species occur each year to other causes, but Region 6 has no current records of take by migratory bird hunters.

Effect Determination: May affect but not likely to adversely affect.

Northern Great Plains piping plover (Charadrius melodus) [T], Mexican spotted owl (Strix occidentalis lucida) [T] Critical Habitat, and Southwest Willow Flycatcher (Washington County, Utah)

Critical habitat for the Northern Great Plains piping plover (breeding habitat within Montana, South Dakota, and North Dakota) and the Mexican spotted owl (National Forest Service lands in Colorado and Utah) is designated in this Region. We do not anticipate that the proposed regulations would adversely affect critical habitat because this action does not alter any primary constituent elements of the designation.

Effect Determination: May affect but not likely to adversely affect.

Southwestern Willow Flycatcher (Empidonax traillii extimus) [E]

The southwestern willow flycatcher is a small migratory songbird that is seasonally present (May-September) in riparian woodlands of the Southwest, with over 90 percent of breeding sites occurring in Arizona, New Mexico, and southern California. This species does occur in waterfowl and dove-hunting areas, but generally not during the hunting season. In the unlikely event that a southwestern willow flycatcher was present during the migratory bird hunting season it is unlikely that hunters would mistake them for a game bird because of their size, coloration, flight profile, and flight pattern.

Effect Determination: May affect but not likely to adversely affect.

Southwestern Willow Flycatcher Critical Habitat

Critical habitat for the southwestern willow flycatcher is located on a combination of Federal, State, tribal, and private lands in Inyo, Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Diego, and Ventura Counties in California; Clark, Lincoln, and Nye Counties in southern Nevada; Kane, San Juan, and Washington Counties in southern Utah; Alamosa, Conejos, Costilla, and La Plata Counties in southern Colorado; Apache, Cochise, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pima, Pinal, Santa Cruz, and Yavapai Counties in Arizona; and Catron, Grant, Hidalgo, Mora, Rio Arriba, Socorro, Taos, and Valencia Counties in New Mexico. We do not anticipate that the proposed regulations would adversely affect critical habitat because this action does not alter any primary constituent elements of the designation.

Effect Determination: May affect but not likely to adversely affect.

Whooping crane (Grus Americana) (E)

Whooping cranes have been shot by hunters in the past, and in 2005 we provided several recommendations to address the potential for misidentification and accidental shooting of migrating whooping cranes. Primary among these were a delay in the opening of the sandhill crane hunting season in Kansas to allow more whooping cranes to migrate through the state prior to hunting and a revision of the Whooping Crane Contingency Plan (Plan), which was completed in 2006. That Plan includes mandatory on-line training for sandhill crane hunters in Kansas that informs them about whooping cranes and tests their ability to distinguish whooping cranes from sandhill cranes, snow geese, and other migratory game birds. These measures, combined with the other measures included in the revised contingency plan, should diminish the likelihood that hunters might misidentify and shoot a whooping crane. We recommend that you continue to formally consult concerning effect to the whooping crane, which may be taken incidentally by migratory bird hunters.

Effect Determination: Likely to adversely affect.

REGION 7
Aleutian Canada goose (Branta canadensis leucopareid) [Delisted March 20, 2001]

Although the Semidi Islands subpopulation is still low, the overall population of this species at the time of delisting far exceeded the levels established by the recovery plan. It is unlikely that sport hunting, with prudent restrictions in wintering areas, will reverse this population trend.

Effect Determination: No effect.

Eskimo curlew (Numenius borealis) [E]

It is unlikely that hunters will encounter Eskimo curlew, and migratory game bird hunting is not known to currently have an adverse effect on the species.

Effect Determination: No effect.

Short-tailed Albatross *(Phoebastria albatrus)* [E]

The short-tailed albatross is the largest of the north Pacific albatrosses (adult wingspan can reach over 7 feet). All birds present in U.S. waters have a prominent pink bill. Adults have a white body with black on the wings. Some adults have a golden-colored hood. Immature birds are dark. There are many plumage variations between all dark and all light birds.

The short-tailed albatross nests exclusively on a few small volcanic islands off the coast of Japan but are regular visitors to the marine waters off Alaska. Because this rarely-encountered species looks unlike any species that may be harvested, and because it rarely ventures near shore, we conclude that the chance of this species being harvested during the Fall/Winter Waterfowl Hunting Season is discountable.

Effect Determination: No effect.

Spectacled Eider (*Somateria fischeri*) [T]
Spectacled eiders are medium-sized sea ducks, averaging about 1,500 g (3.3 lbs.) in weight and 50 cm (9.7 inches) in total length. Males in breeding plumage have a white back, black breast, and pale green head with large white, black-rimmed “spectacles” around the eyes (Figure 10). In late summer and autumn adult 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 females are mottled brown and males mottled brown and white. Both males and females have sloped foreheads and bills.

Spectacled eiders are at risk to shooting where fall and winter populations overlap with hunting activities in western, north, and northwest Alaska, Ledyard Bay, Norton Sound, and the Bering Sea west, south, and southwest of Lawrence Island. Because they often fly in mixed-species flocks, and are similar in size to the unlisted common and king eiders, spectacled eiders can be difficult to distinguish from other eiders that can be legally hunted; thus, they are subject to misidentification and inadvertent harvest during migration. They may also be taken by hunters that are unaware of that fact that spectacled eiders cannot be legally hunted, and by hunters not inclined to comply with species-specific closures.

Effect Determination: Likely to adversely affect.

Spectacled Eider Critical Habitat
Critical habitat for the spectacled eider has been designated to protect molting areas in Norton Sound and Ledyard Bay, nesting areas on the Y-K Delta, and the wintering area south of St. Lawrence Island. Although hunting for migratory game birds will occur in these areas, habitat components essential to the conservation of the eider will not be affected by the proposed action.

Effect Determination: Not likely to adversely affect critical habitat.

Steller's Eider (Alaska Breeding Population) (*Polysticta stelleri*) [T]
The Steller's eider is the smallest of the four eider species, weighing approximately 700–800 g (1.5–1.8 lbs.). Males are in breeding plumage from early winter through mid-summer. Breeding males have a large white shoulder patch contrasting with chestnut breast and belly that darkens centrally, and a black spot on each side in front of their wings. Their head is white to silver with pale green on the lores, a distinctive black spot surrounding each eye, and a dark olive patch flanked by black on the nape. Their neck is black, extending in arrow shape down the back. During late summer and fall, males molt to dark brown with a white-bordered blue wing speculum. Following replacement of flight feathers in the fall, males re-acquire breeding plumage, which lasts through the next summer. Females are dark mottled brown with a white-bordered blue wing speculum year-round. Juveniles are dark mottled brown until fall of their second year, when they acquire breeding plumage.

Alaska-breeding Steller's eiders may be shot where fall and winter populations overlap with hunting activities in southwest, western, south-central, north, and northwest Alaska, the Aleutian Islands, the Alaska Peninsula, and Kodiak Island. Steller's eiders may fly in single or mixed-species flocks, and are difficult to distinguish from other eiders that are legally hunted. They may also be taken by hunters that are unaware of that fact that spectacled eiders cannot be legally hunted, and by hunters not inclined to comply with species-specific closures.

Effect Determination: Likely to adversely affect.

REGION 8
California Condor *(Gymnogyps californianus)* [E]

The California condor is among the largest flying birds in the world. Adults weigh approximately 17 to 22 pounds and have a wing span up to 9.5 feet. Plumage is black, with prominent white under-wings and naked kin on the head and neck that ranges from gray to shades of yellow, red, and orange. Males and females cannot be distinguished by size or plumage. California condors nest in various types of rock formation including caves, crevices, overhung ledges, and potholes, and more rarely, in cavities in giant sequoia trees (Sequoiadendron giganteum giganteus). CACO are opportunistic scavengers, feeding only on the carcasses of dead animals. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and occasionally hours of waiting at a roost or on the ground near a carcass. Seasonal foraging behavior shifts perhaps are the result of climatic cycles or due to changes in food availability. Condors maintain wide-ranging foraging patterns throughout the year, an important adaptation for a species that may be subjected to unpredictable food supplies.

Hunters cannot mistake the condor for any legally hunted species of bird covered by the proposed regulations; therefore, direct mortality of California condor is not a concern. A limited amount of band-tailed pigeon and mourning dove hunting occurs within the occupied range of this species. While condors may forage in areas where band-tailed pigeon and mourning dove are hunted, and lead shot is not banned for use in hunting upland game birds, it is unlikely that condors will feed upon and therefore exposed to lead from upland game bird carcasses. The proposed regulations do not allow the use of lead shot for hunting waterfowl; therefore, lead poisoning of the California condor from eating waterfowl contaminated by lead shot is not an issue in this consultation.

Effect Determination: Not likely to adversely affect.

California Condor Critical Habitat

Critical habitat for the California condor has been designated in Los Angeles, Ventura, Santa Barbara, San Luis Obispo, Kern, and Tulare Counties, California. Although hunting for migratory game birds will occur in these areas, habitat components essential to the conservation of the condor will not be affected by the proposed action.

Effect Determination: Not likely to adversely affect critical habitat.

California Clapper Rail (Rallus longirostris obsoletus) [E]

The California clapper rail, one of the largest rails, is a year-round resident of coastal salt and brackish marshes and tidal sloughs of San Francisco Bay and Suisun Bay. Males and females are similar in apprearance, with olive brown back and wings marked by dark brown streaks; the breast is rusty cinnamon, and black and white bars crisscross its flanks. The breeding season of California clapper rails beins by February. Nesting starts in mid-March and extends into August. The end of the breeding season is typically defined as the end of August, which

corresponds with the time when eggs laid during re-nesting attempts have hatched and young are mobile.

Although coots and moorhens are in the rail family (Rallidae), may be legally hunted, and occur in the same habitat with California clapper rails, it is not likely that California clapper rails would be confused for coots, moorhens, or any other legally hunted migratory game bird within their range because of their difference in appearance and behavior. Clapper rails are secretive, rarely fly, and spend most of their time hidden in thick marsh vegetation, while coots and moorhens spend most of their time during the non-breeding season on the water surface or open shoreline. Migratory game bird hunting will not occur during the breeding season for California clapper rail, and it is likely that migratory game bird hunting will rarely disturb rails during the non-breeding season due to the limited co-occurrence of hunting in or near rail habitat. We do not anticipate that a temporary disruption of behavior patterns from proposed activities would be significant nor would it be likely to result in injury to individual birds.

Effect Determination: Not likely to adversely affect.

Coastal California Gnatcatcher *(Polioptila californica californica)* [T]

The coastal California gnatcatcher is a small, long-tailed member of the old-world warbler and gnatcatcher family which is restricted to coastal southern California and Baja California, and is primarily found in coastal sage scrub communities. It is dark blue-gray above and grayish-white below. The tail is mostly black above and below. The male has a distinctive black cap, which is absent during the winter. The breeding season of the coastal California gnatcatcher extends from about February 15 through August 30, with the peak of nesting activity occurring from mid-March through mid-May.

Because of its relatively small size and the limited migratory game bird hunting opportunities in coastal sage scrub habitats, it is extremely unlikely that the gnatcatcher would be mistaken for any of the migratory game birds covered by the proposed regulations.

Hunters traversing coastal sage scrub habitats in southern California may cause gnatcatchers to temporarily alter their normal behavioral patterns. However, given the limited hunting opportunities for migratory game birds in coastal sage scrub habitats, the short-term nature of any potential interactions between hunters and gnatcatchers, and the fact that hunting will not occur during the gnatcatcher breeding season, we conclude that disturbance of gnatcatchers caused by the proposed regulations is rare and we do not anticipate that a temporary disruption of behavior patterns from proposed activities would be significant nor would it be likely to result in injury to individual birds.

Effect Determination: Not likely to adversely affect.

Coastal California Gnatcatcher Critical Habitat

Critical habitat for the coastal California gnatcatcher was finalized in December 2007. Although hunting for migratory game birds may occur in designated critical habitat, the proposed action would not result in the removal or degradation of habitat components essential to the conservation of the gnatcatcher.

Effect Determination: Not likely to adversely affect critical habitat.

California Least Tern *(Sterna antillarum browni)* [E]

The California least tern, the smallest member of the gull and tern family, is a migratory colonial nesting shorebird that occurs along the coastline of California from April to September, where it nests on sandy beaches or mudflats near the ocean. Least terns are also known to nest in the southern San Joaquin Valley. This species does occur in waterfowl and dove hunting areas, but generally not during the hunting season. In the unlikely event that a least tern was present during the migratory bird hunting season, it is unlikely that hunters would mistake them for a game bird because of their size, coloration, flight profile, and flight pattern.

Effect Determination: Not likely to adversely affect.

Inyo California Towhee *(Pipilo crissalis eremophilus)* [T]

This medium-sized, sparrow-like, nonmigratory songbird is restricted to riparian thickets and adjacent uplands in the remote southern Argus Mountains of Inyo County, California. Because this species occurs in a remote location, is limited in distribution, and because of the limited opportunities for migratory game bird hunting in this area (68 percent of its range is on Department of Defense lands), we expect that there is little overlap between the proposed action and the range of the species. In the event that migratory game birds are hunted in the towhee's range it is unlikely that it would be mistaken for a game bird, as it is not similar in appearance to any legally hunted species under the proposed regulations.

The Service proposed to delist the Inyo California towhee on November 4, 2013 (78 FR 65938). A final rule has not been published so the species remains listed as Threatened.

Effect Determination: Not likely to adversely affect.

Inyo California Towhee Critical Habitat

Critical habitat for the Inyo California towhee has been designated in the Argus Range in Inyo County, California. For the reasons stated above, there is little, if any, overlap between the proposed action and towhee critical habitat. In the event that there is overlap, the proposed action is not expected to cause removal or degradation of habitat components essential to the conservation of the towhee.

Effect Determination: Not likely to affect affect.

Least Bell's Vireo *(Vireo belli pusillus)* [E]

The least Bell's vireo is a small migratory songbird that is seasonally present (mid-March to mid-September) in thickets of riparian vegetation in southern California and northern Baja California, Mexico. This species may occur in waterfowl and dove-hunting areas, but generally not during the hunting season. In the unlikely event that a least Bell's vireo was present during the migratory bird hunting season, it is unlikely that hunters would mistake them for a game bird because of their small size, coloration, flight profile, and flight pattern.

Effect Determination: Not likely to adversely affect.

Least Bell's Vireo Critical Habitat

Critical habitat for the least Bell's vireo has been designated along 10 riparian areas in southern California. We are not aware of any migratory game bird hunting occurring in these areas. If migratory game bird hunting did occur in any of these areas it would not result in the alteration of any habitat components essential to the conservation of the vireo, namely riparian woodland vegetation that generally contains both canopy and shrub layers and includes some associated upland habitats.

Effect Determination: Not likely to adversely affect.

Light-footed Clapper Rail *(Rallus longirostris levipes)* [E]

The light-footed clapper rail is a year-round resident in coastal wetlands of southern California and northern Baja California, Mexico. The light-footed clapper rail is found in freshwater and saltwater marshes containing cordgrass (Spartina foliosa), cattails (Typha spp.), rushes (Juncus spp.) and dense vegetation.

The breeding season for the light-footed clapper rail is mid-March to mid-August. Mating pairs build an incubation nest for their eggs and usually one or more brood nests to serve as refuges for the young rails during high tide.

Although coots and moorhens are in the rail family (Rallidae), may be legally hunted, and occur in the same habitat with light-footed clapper rails, it is not likely that light-footed clapper rails would be confused for coots, moorhens, or any other legally hunted migratory game bird within their range because of their difference in appearance and behavior. Clapper rails are secretive, rarely fly, and spend most of their time hidden in thick marsh vegetation, while coots and moorhens spend most of their time during the non-breeding season on the water surface or open shoreline. Migratory game bird hunting does not occur during the breeding season for the light-footed clapper rail, and hunting opportunities are extremely limited within the range of the light-footed clapper rail during the non-breeding season. Several of the marshes inhabited by this species are under Federal ownership that do not allow hunting at all, and hunting is prohibited in most of the coastal marshes in southern California because of their proximity to urban areas.

On rare occasions when migratory bird hunting occurs in occupied clapper rail habitat during the non-breeding season, hunters may temporarily displace light-footed clapper rails, but this is expected to occur infrequently due to clapper rail’s preference for thick marsh vegetation, which hunters are unlikely to penetrate. We do not expect any short-term temporary displacement to be significant to the rail's ability to feed or shelter because it would occur outside of the light-footed clapper rail nesting season.

Effect Determination: Not likely to adversely affect.

Marbled Murrelet (Brachyramphus marmoratus) (Washington, Oregon, and California Population) [T]

The marbled murrelet is a small diving seabird that breeds along the Pacific coast of North America from the Aleutian Archipelago and southwestern Alaska to central California. It forages almost exclusively in the near-shore marine environment, but flies inland to nest in mature

conifer trees located in forest stands with old-growth forest characteristics. Marbled murrelet

nesting occurs over an extended period from late-March to late-September. Murrelets have been detected at inland sites throughout the year but it is believed that most individuals go out to sea for extended periods during the winter.

The marbled murrelet occurs in several coastal and forest locations containing band-tailed pigeons and mourning doves. Hunters are unlikely to mistake a marbled murrelet for any legally hunted migratory game bird, as it is not similar in appearance to any legally hunted species under the proposed regulations. Noise associated with gunshots from legal hunting activities and hunters moving through the forest are unlikely to significantly alter breeding of murrelets because the proposed action will occur outside of the murrelet breeding season. There have been no records of take of marbled murrelets during open hunting season due to misidentification by sport hunters. Any temporary displacement of murrelets during marine/estuarine hunting activities is not expected to result in a measurable adverse effect to murrelet breeding, foraging, or loafing because they are likely to simply move away from the disturbance and continue their loafing or feeding activities elsewhere.

Effect Determination: Not likely to adversely affect.

Marbled Murrelet Critical Habitat

Critical habitat for the marbled murrelet has been designated in old growth forests of Washington, Oregon, and California. The proposed action will have no effect on old growth habitat function or value and therefore will not affect marbled murrelet critical habitat.

Effect Determination: Not likely to adversely affect.

Northern Spotted Owl (Strix occidentalis caurina) [T]

The northern spotted owl is a dark brown medium-sized owl with a barred tail and white spots on the head and breast. It inhabits mature and old growth forests from northwestern California to southwestern British Columbia. Spotted owls begin courtship activities in late February or March, most eggs hatch in late April or May, and the majority of young fledge in June. The northern spotted owl occurs in several coastal locations within Region 8 where hunting for band-tailed pigeons and mourning doves may occur. The spotted owl's nocturnal habitats, its silhouette, size, and color make it highly unlikely that it would be mistaken for a band-tailed pigeon or a mourning dove. Noise associated with gunshots from legal hunting activities and hunters moving through the forest are unlikely to significantly alter breeding, feeding, or sheltering of owls because the proposed action will occur outside of the owl breeding season.

Effect Determination: Not likely to adversely affect.

Northern Spotted Owl Critical Habitat

Critical habitat for the northern spotted owl has been designated in old growth forests of Washington, Oregon, and California. The proposed action will have no effect on old growth habitat function or value and therefore will not affect northern spotted owl critical habitat.

Effect Determination: Not likely to adversely affect.

Southwestern Willow Flycatcher *(Empidonax traillii extimus)* [E]

The southwestern willow flycatcher is a small migratory songbird that is seasonally present (May-September) in riparian woodlands of the Southwest, with over 90 percent of breeding sites occurring in Arizona, New Mexico, and southern California. This species does occur in waterfowl and dove-hunting areas, but generally not during the hunting season. In the unlikely event that a southwestern willow flycatcher was present during the migratory bird hunting season it is unlikely that hunters would mistake them for a game bird because of their small size, coloration, flight profile, and flight pattern.

Effect Determination: Not likely to adversely affect.

Southwestern Willow Flycatcher Critical Habitat

Critical habitat for this species was designated on January 3, 2013. In Region 8, critical habitat was designated in riparian woodland corridors in nine counties in southern California and three counties in southern Nevada. There is only a very limited potential for hunting of migratory game birds within designated critical habitat for the southwestern willow flycatcher. If migratory game bird hunting does occur in any of these areas, it is not likely to result in the alteration of any habitat components essential to the conservation of the flycatcher (dense riparian woodland vegetation that generally contains both canopy and shrub layers and supports a high-density invertebrate prey population) because hunting use of these areas is expected to be relatively light with minimal impacts to vegetation.

Effect Determination: Not likely to adversely affect.

Streaked Horned Lark *(Eremophila alpestris strigata)* [T]

The streaked horned lark is a small, ground-dwelling songbird with conspicuous feather tufts, or "horns," on its head. Its back is heavily streaked with black, contrasting sharply with its deeply ruddy nape and yellow underparts. The streaked horned lark nests on the ground in sparsely vegetated sites in short-grass dominated habitats. Historically, this type of habitat was found in prairies in western Oregon and Washington. More recently, streaked horned larks have used manmade habitats for nesting, including fallow agricultural fields, lightly to moderately grazed pastures, seasonal mudflats, airports, and dredged material islands in the Columbia River.

Streaked horned larks are also found in dune habitats along the coast. This migratory species is generally believed to winter in California, but documentation is lacking. The horned lark nesting season extends from March to June.

Although the streaked horned lark may occur in some migratory bird hunting areas, it is unlikely that it would be confused with any migratory game bird species covered by the proposed regulations due to its size, coloration, flight pattern, and distinct silhouette. Furthermore, its nesting season, when it is most vulnerable to disturbance, does not overlap with the proposed hunting seasons. Although streaked horned larks may be disturbed on their wintering grounds, we do not anticipate that a temporary disruption of behavior patterns from proposed activities would be significant nor would it be likely to result in injury to individual birds.

Effect Determination: Not likely to adversely affect.

Western Snowy Plover; Pacific Coast population *(Charadrius nivosus nivosus)* [T]

The Pacific Coast population of western snowy plover (western snowy plover) breeds primarily on coastal beaches from Washington to southern Baja California, Mexico, and winters in coastal areas from southern Washington to Baja California, Mexico. Western snowy plovers are pale gray-brown above and white below, with a white hind-neck collar and dark lateral breast patches, forehead bar, and eye patches. The western snowy plover nesting season extends from early March through late September. While some western snowy plovers remain in their coastal breeding areas year-round, others move south or north for winter. Due to their small size, silhouette, and flight pattern, it is extremely unlikely that western snowy plovers would be confused with any migratory game bird species. Disturbance of nesting western snowy plovers is not anticipated under the proposed action, because hunting seasons will not overlap with the nesting season.

The sport of training falcons for hunting could result in losses of western snowy plovers when predators are introduced to plover habitats. However, because the proposed action includes a conservation measure that prohibits falconry activities in the vicinity of nesting colonies or nesting concentrations of federally listed threatened and endangered shorebirds, the introduction of predators due to legal falconry practices is not expected to occur.

Effect Determination: No effect.

Western Snowy Plover; Pacific Coast Population Critical Habitat

Critical habitat for the Pacific Coast population of the western snowy plover has been designated in coastal areas from mid-Washington to the Mexican border in California. The proposed action will have no effect on coastal habitat function or value and therefore will not affect designated critical habitat for the Pacific Coast population of the western snowy plover.

Effect Determination: No effect.

Yellow-billed Cuckoo (Western U.S. DPS) *(Coccyzus americanus)* [T]

The yellow-billed cuckoo is a medium sized bird that occurs in riparian habitats where waterfowl hunting may occur. This species has a slender, long-tailed profile, with a fairly stout and slightly down-curved bill. The tail feathers are boldly patterned with black and white below. The breeding season for the yellow-billed cuckoo generally begins with pair formation in mid-June and lasts until mid-August. Yellow-billed cuckoos annually migrate to wintering grounds in South America. Spring migration begins in late May and lasts until late June, and fall migration begins in late August and lasts until mid-September.

We do not anticipate adverse effects to this species as a result of the proposed action because it is not present in the action area during the migratory game bird hunting season.

Effect Determination: No effect.

Yuma Clapper Rail *(Rallus longirostris yumanensis)* [E]

The Yuma clapper rail is a marsh bird with a short tail, long legs, a downcurved beak, and short rounded wings that uses freshwater marsh habitats. Within Region 8, this species occurs year-

round along the lower Colorado River and at the Salton Sea and is presumed to occur year-round on the Muddy River, Virgin River, Ash Meadows National Wildlife Refuge, and Pahranagat National Wildlife Refuge. The breeding season for Yuma clapper rails occurs from mid-March to July.

Although coots and moorhens are in the rail family (Rallidae), may be legally hunted, and occur in the same habitat with Yuma clapper rails, it is not likely that Yuma clapper rails would be confused for coots, moorhens, or any other legally hunted migratory game bird within their range because of their difference in appearance and behavior. Clapper rails are secretive, rarely fly, and spend most of their time hidden in thick marsh vegetation, while coots and moorhens spend most of their time during the non-breeding season on the water surface or open shoreline. Migratory game bird hunting will not occur during the breeding season for the Yuma clapper rail, and it is likely that migratory game bird hunting will rarely disturb rails during the non-breeding season due to the limited co-occurrence of hunting in or near rail habitat. We do not anticipate that a temporary disruption of behavior patterns from proposed activities would be significant nor would it be likely to result in injury to individual birds.

Effect Determination: Not likely to adversely affect.