BIOLOGICAL OPINION On the Effects of the Akutan Airport Project on Steller's Eiders (*Polysticta stelleri*) and Northern Sea Otter (*Enhydra lutris kenyoni*)

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BIOLOGICAL OPINION
On the Effects of the Akutan Airport Project on Steller's Eiders (*Polysticta stelleri*) and Northern Sea Otter (*Enhydra lutris kenyoni*)

DESCRIPTION OF PROPOSED ACTION

The Federal Aviation Administration (FAA) in cooperation with Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to construct a land-based airport Akun Island to serve the community of Akutan. The City of Akutan on Akutan Island is located 35 miles east of Unalaska at approximately 54.1355560° north latitude and 165.77306° west longitude (HDR Alaska, Inc. 2006). Construction activities would begin in summer 2007 and end in fall 2008. Construction activities during winter months will be limited due to heavy winds and snow squalls.

The purpose of the Akutan Airport Project is to provide reliable, aircraft service to Akutan (HDR Alaska, Inc. 2006). The preferred alternative proposes construction of a new airstrip on nearby Akun Island (Figure 1). Uninhabited Akun Island lies approximately seven miles east from the mouth of Akutan Harbor across Akutan Bay. Currently, the City of Akutan is serviced only by a Peninsula Airways (PenAir) Grumman Goose that has become an antiquated aircraft. The Goose is often precluded from flying to Akutan due to rough wave conditions, low cloud cover, and high winds. Further, the Goose's 9 person capacity does not adequately meet the needs of the community and Trident Seafood. Due to poor weather and Goose repair cancellations, the community has been without emergency air service for long periods of time. Finally, because there is no land based airport facility, there is no competition for air services which results in no flight choices and potentially higher costs. The construction of the proposed airport will make it possible for land-based aircraft to reliably access the community of Akutan, ensure that Akutan will remain accessible by air travel after the Grumman Goose are no longer operational, and to accommodate growth in the community (HDR Alaska, Inc. 2006).

The community of Akutan, located on the north side of Akutan Harbor, sits on a narrow bench of relatively flat land between the harbor and 1,500 to 1,700-foot (ft) mountains to the north of the community (HDR Alaska, Inc. 2006). The number of Akutan's permanent residents is around 100, but when the Trident Seafood processing plant is in operation, the population increases to 150 to 1,000, depending on the seasonal employees. There are no roads connecting Akutan to other communities, and there is currently no land based airport serving the area (HDR Alaska, Inc. 2006).

The Akun Island alternative is considered the preferred alternative for a number of reasons: 1) the gradual terrain on Akun facilitates a 4,500 ft runway; 2) because a 4,500 ft runway is possible on Akun, the SAAB 340 could fly to Akun without weight restriction, accommodating approximately 30 passengers per flight; 3) electronic navigation facilities would be available, allowing planes to operate in adverse weather; 4) planes landing at this location would be visible from the community; 5) volcanic hazard is less in this area compared to other sites; 6) marine service by hovercraft between the community of Akutan and Surf Bay on Akun Island would satisfy passenger comfort and weather operability goals; and 7) Surf Beach offers a protected hovercraft landing area (HDR Alaska, Inc. 2006).

The Akun Alternative proposes to:

- Construct a 30-meter (100-foot) by 37-meter (120-foot) hovercraft storage and maintenance facility on a 44-meter (145-foot) by 46-meter (150-foot) pad at the head of Akutan Harbor.
- Construct a 46-meter (150-foot) by 46-meter (150-foot) hovercraft maneuvering pad adjacent to the storage and maintenance facility, and a 30-meter (100-foot) by 49 meter (160-foot) ramp from the facility to the water. This will result in a loss of approximately 0.20 hectares (0.5 acres) of marine habitat.
- Construct a 1372-meter (4,500-foot) long by 23-meter (75-foot) wide paved runway.
- Construct a 1554-meter (5,100-foot) long by 46-meter (150-foot) wide Runway Safety Area.
- Construct a 91-meter (300-foot) long by 11-meter (35-foot) wide taxiway.
- Construct a 3252-square meter (35,000-square foot) aviation support area.
- Construct a 939-square meter (10,000-square foot) Snow Removal Equipment Building (SREB) pad.
- Construct a new SREB, which would be a heated, two-bay building, approximately 13-meter (44-foot) wide by 15-meter (50-foot) long.
- Equip the SREB building with a generator for heat and water holding capacity and septic to provide a passenger waiting area and restroom facility.
- Equip the airport with a Precision Approach Path Indicator system for approaches on both runway ends.
- Construct a 914-meter (3,000-foot), 7-meter (24-foot) wide, two-lane all-weather gravel road for travel between the hovercraft landing site at Surf Beach and the proposed airport f acilities on the above bench.
- Construct one culvert along the runway.
- Construct a hovercraft landing ramp at Surf Bay. This will result in a loss of approximately 0.28 hectares (0.7 acres) of marine habitat.
- Purchase of a hovercraft and bus.

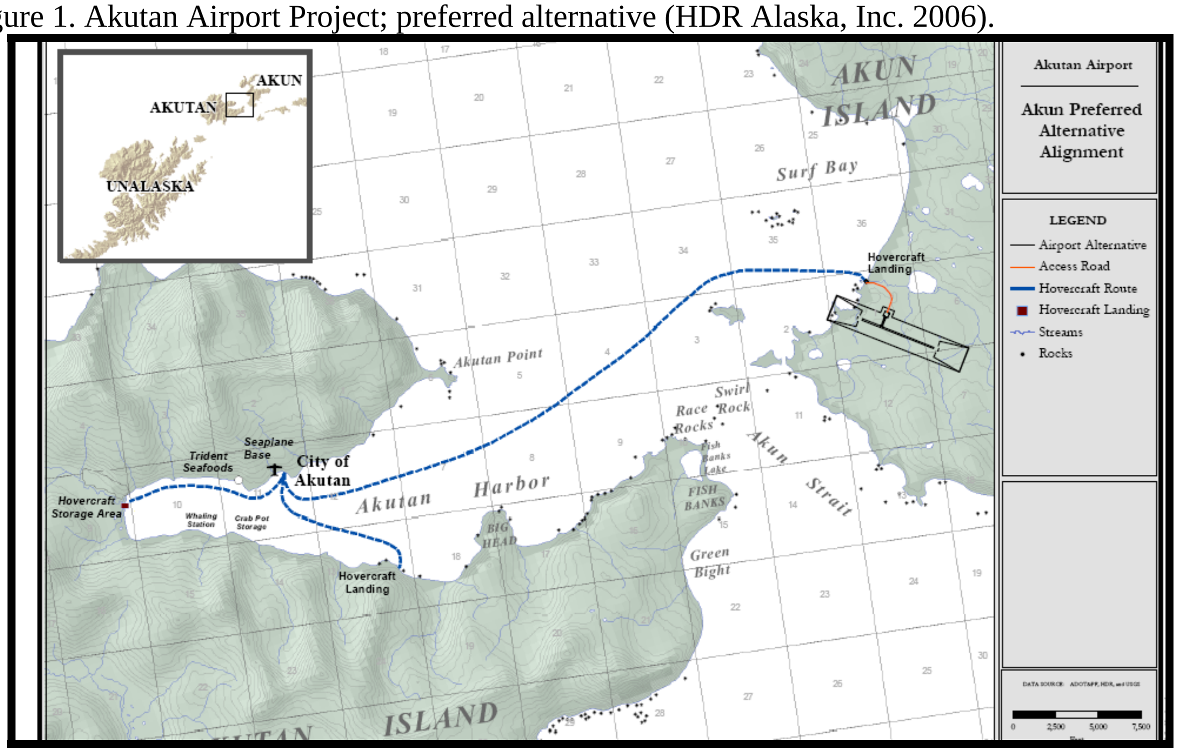
Access to the Akun Airport would be provided by hovercraft from the City of Akutan to Surf Beach. A 914 meter (3,000-ft) long road would connect the hovercraft landing pad on Surf Beach to the runway located on the bench above the beach. A bus would be used to transport passengers between the hovercraft and aircraft. When not in use, the hovercraft would be stored in a building at the head of Akutan Harbor.

The hovercraft route will travel south from the Akutan terminal into the middle of Akutan Harbor and travel straight across Akun Strait, north of Green Island and into Surf Bay (Figure 1). The hovercraft would travel the proposed route two times per day, seven days a week, except for January. There will be an increased number of flights into the airport during the month of January to accommodate the influx of seasonal workers at Trident. This will require the number of daily hovercraft trips to increase to approximately four trips per day during January. While shuttling passengers and cargo, the hovercraft will also transport diesel to Akun Island to supply a 7571 liter (2,000-gallon) above ground storage tank with fuel to operate the airport maintenance equipment. Power will be provided for the airport by an onsite diesel generator. The generator will provide power for the SREB, which is a heated, two-bay building approximately 13 meters (44 ft) wide by 15 meters (50 ft) long. The generator will also power runway lights, a beacon, and a lighted wind cone. Lighting would include: radio-controlled medium intensity runway lighting and medium intensity taxi way lighting, a rotating beacon, and a lighted wind cone and segmented circle. Airfield aids would include a supplemental unlighted wind cone, reflective cones, and threshold panels.

The airport rotating beacon projects a beam of light in two directions, 180 degrees apart. The rotating beacon produces alternating clear and green flashes of light with a flash rate of 24-30 flashes per minute. The runway and taxi lighting would be turned on by the pilot as the plane approaches the airport. These lights would stay on for approximately 15 minutes before powering off. The majority of flights will be during the daytime when runway lighting is not necessary.

Currently, there are four, 75,708-liter (20,000 gallon) tanks in the tank farm at the Akutan fuel facility. A fueling station and an operator are also available. Standard spill response equipment is located on the dock, and the US Coast Guard has inspected and licensed the facility. This would be used for fuel storage for hovercraft operations. During construction activities, fuel will be transported from Akutan to Akun in vessels. The contractor would refuel construction equipment from a storage area located near the proposed airport apron on Akun.

Figure 1. Akutan Airport Project; preferred alternative (HDR Alaska, Inc. 2006).



FAA and DOT&PF have determined that use of the BHT 130 hovercraft is suitable for service across Akutan Bay and Harbor to the airstrip on Akun Island. This model is a “half-well” configuration hovercraft with vehicle bow ramp that carries approximately 50 passengers and up to four vehicles or a similar amount of freight in the open well deck. This vessel is 29 meters (95 ft) long and will travel approximately 40 knots (is capable of travel speed up to 60 knots in calm conditions).

STATUS OF THE SPECIES - Steller's eider (*Polysticta stelleri*)

Species Description

The Steller's eider was listed as a threatened species on June 11, 1997 (62 FR 31748). Critical habitat was designated for the Steller's eider on February 6, 2001 (65 FR 13262). The Steller's eider is the smallest of the eiders. The average weight of adult male and female Steller's eiders is 1.94 pounds (Bellrose 1980). Adult male Steller's eiders in breeding plumage have a black back, white shoulders, and a chestnut brown breast and belly. The males have a white head with black eye patches; they also have a black chin patch and a small greenish patch on the back of the head. Females and juveniles are mottled dark brown.

Life History

Longevity

Steller's eiders are long lived, with individuals known to have lived at least as long as 21 years and 4 months in the wild (band number 647-66747). Other ages recorded for this species in the wild are 20 years, 4 months (band numbers 647-66757 and 1077-13265), 19 years, 3 months (band number 647-64547), and 16 years (band numbers 1157-01787 and 1157-01876)(Chris Dau, US Fish and Wildlife Sevice, Migratory Bird Management Division, pers. comm.).

Energetics

Goudie and Ankney (1986) suggest that small-bodied sea ducks such as harlequin (*Histrionicus histrionicus*) and long-tailed ducks (*Clangula hyemalis*) that winter at northern latitudes do so near the limits of their energetic threshold. These species have little flexibility in regards to caloric consumption or in their opportunity to rely on caloric reserves. Under this life history strategy, such species are vulnerable to perturbations within their winter habitat. Because the Steller's eider is relatively small-bodied, being intermediate in size to the harlequin and long-tailed ducks (Bellrose 1980), and because it overlaps with harlequins and long-tailed ducks in its choice of foraging areas and prey items, the species may, like the harlequin and long-tailed ducks, exist near its energetic limits. Unlike other larger eiders, Steller's eiders must continue to feed upon reaching their nesting areas, to build up enough energy reserves to breed (D. Solovieva, Zoological Institute, Russian Academy of Science, pers. comm.). In addition, female Steller's eiders must continue to feed during incubation. Spectacled eiders, a larger bodied sea duck, apparently do not exist so close to their energetic threshold; they arrive on the nesting grounds fit enough to fast through egg laying and incubation.

Age to Maturity

Sexual maturity is believed to be deferred to the second year (Bellrose 1980).

Reproductive Strategy
Johnsgard (1994) indicated that pair formation for most sea ducks occurs in fall and spring. Metzner (1993) hypothesized that Steller's eiders at Izembek Lagoon and Cold Bay paired in the spring because they were apparently too preoccupied with feeding during the fall and winter to form pair bonds. The length of time that Steller's eiders remain paired is unknown. However, long-term pair bonds have been documented in other ducks (Bengtson 1972, Savard 1985).

Pairs of Steller's eiders arrive at Point Barrow as early as June 5 (Bent 1987). While nesting, Steller's eiders often occupy shallow coastal wetlands in association with tundra (Bent 1987, Quakenbush and others 1995, Solovieva 1997), although we have records of aerial observations of Steller's eider pairs well inland on the Arctic Coastal Plain (ACP). This species establishes nests near shallow ponds or lakes, usually close to water.

Clutch size has been reported to range from two to ten eggs (Bent 1987, Bellrose 1980, Quakenbush and others 1995). The average clutch size of successful nests near Barrow is reported as 4.6 (n = 8). Solovieva (1997) found that clutch size for Steller's eiders on the Lena Delta varied between five and eight eggs with an average of 6.1 (n = 32). Nesting success near Barrow (percent of nests where eggs hatch) is variable (Quakenbush and others 1995). In 1991, five of six nests hatched while in 1993, only four of 20 nests hatched. During some years, the species apparently does not even attempt to nest near Barrow (Quakenbush and others 1995).

Recruitment
Steller's eider recruitment rate (the percentage of fledged birds that reach sexual maturity) is unknown. However, there is limited information regarding Steller's eider fledging rate. Near Barrow, 83.3 percent (five of six) of Steller's eiders nests with eggs hatched in 1991, 20.0 percent (four of 20) hatched in 1993 (Quakenbush and others 1995), and 15 percent (three of 20) hatched in 2000 (Philip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm.). In other years, Steller's eiders do not even attempt to breed near Barrow (Philip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm., Quakenbush and others 1995). We conclude that the annual recruitment rate for this species is likely variable.

Seasonal Distribution Patterns
<u>Banded and Satellite-Tagged Alaskan Breeding Birds</u>: Little is known of the distribution of Alaska breeding Steller's eiders outside of the breeding season. A few band recoveries indicate that birds that breed near Barrow undergo molt in Izembek Lagoon. A satellite telemetry study was initiated in 2000 to investigate the molting and wintering locations of the Alaskan population of Steller's eiders. Satellite transmitters were placed on four Steller's eiders captured in Barrow. Two Steller's eiders (one male and one female) spent the molting season on the Kuskokwim Shoals, while a third (a male) molted near the Seal Islands (Philip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm.). Both birds that molted at Kuskokwim Shoals moved on to the Hook Bay portion of Bechevin Bay in November. The male remained in Hook Bay at least until late December when his transmitter stopped working. The female remained at Hook Bay until early February, at which time she returned to Izembeck Lagoon and remained there into spring. The bird that molted near the Seal Islands moved west to

Nelson Lagoon in October. After spending approximately 3 weeks at Nelson Lagoon, this bird moved west to Sanak Island at the end of November. The bird remained at Sanak Island for 3 months. During this time his use area was small, only a few square kilometers. By March 4, he had moved back to Izembek Lagoon in the vicinity of his November locations (Philip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm.).

Breeding Distribution - The exact historical breeding range of the Alaska-breeding population of Steller's eiders is not clear. The historical breeding range may have extended discontinuously from the eastern Aleutian Islands to the western and northern Alaska coasts, possibly as far east as the Canadian border. In more recent times, breeding occurred in two general areas, the Arctic Coastal Plain (ACP), and western Alaska, primarily on the Yukon-Kuskokwim (Y-K) Delta. Currently, Steller's eiders breed on the western ACP in northern Alaska, from approximately Point Lay east to Prudhoe Bay, and in extremely low numbers on the Y-K Delta.

On the ACP, anecdotal historical records indicate that the species occurred from Wainwright east, nearly to the Alaska-Canada border (Anderson 1913; Brooks 1915). There are very few nesting records from the eastern ACP, however, so it is unknown if the species commonly nested there or not. Currently, the species predominantly breeds on the western ACP, in the northern half of the National Petroleum Reserve - Alaska (NPR-A). The majority of sightings in the last decade have occurred east of the mouth of the Utukok River, west of the Colville River, and within 90 km (56 mi) of the coast. Within this extensive area, Steller's eiders generally breed at very low densities.

The Steller's eider was considered a locally "common" breeder in the intertidal, central Y-K Delta by naturalists early in the 1900s (Murie 1924; Conover 1926; Gillham 1941; Brandt 1943), but the bird was reported to breed in only a few locations. By the 1960s or 70s, the species had become extremely rare on the Y-K Delta, and only six nests have been found in the 1990s (Flint and Herzog 1999). One to two nests continue to be found each year during the course of extensive ground-based waterfowl research and surveys. Given the paucity of early-recorded observations, only subjective estimates can be made of the Steller's eider's historical abundance or distribution on the Y-K Delta.

A few Steller's eiders were reportedly found nesting in other locations in western Alaska, including the Aleutian Islands in the 1870s and 80s (Gabrielson and Lincoln 1959), Alaska Peninsula in the 1880s or 90s (Murie and Scheffer 1959), Seward Peninsula in the 1870s (Portenko 1972), and on Saint Lawrence Island as recently as the 1950s (Fay and Cade 1959). It is unknown how regularly these areas were used or whether the species ever nested in intervening areas.

Post-Breeding Distribution and Fall Migration - Following breeding, males and some females with failed nests depart their Russian nesting area and return to marine waters (Solovieva 1997). We know little of Steller's eiders use of marine waters adjacent to Alaska's ACP and along the west and southwest coast of Alaska during late summer and fall migration. Historical observations made by Murdoch (1885 as in Bent 1987) indicate that birds that have bred near Point Barrow begin to return to the coast from the first to the middle of July. In addition, he indicated that they disappear from the Barrow area from the first to the middle of August.

Steller's eiders arrived at St. Michael around 21 September (Bent 1987). Late date of departure was as follows: Point Barrow, September 17; St. Michael, October 5; and Ugashik, November 28 (Bent 1987).

Over 15,000 Steller's eiders were observed on September 27, 1996, in Kuskokwim Bay (Larned and Tiplady 1996). Most (nearly 14,000) were located along the mainland side of barrier islands while about 1,100 were detected further offshore. Despite this species' apparent preference for near-shore habitats, several groups were detected over 10 kilometers (km) from shore and two groups were over 30 km from shore.

In late summer and fall, large numbers of Steller's eiders molt in a few lagoons located on the north side of the Alaska Peninsula (i.e., Izembek and Nelson Lagoon/Port Moller Complex, Seal Islands) (Petersen 1980, 1981). Recent observations of over 15,000 Steller's eiders in Kuskokwim Bay, and the observation of two out of three satellite-tagged birds from Barrow molting there suggests that Kuskokwim Bay may also be a notable molting area for this species and for the listed entity (Larned and Tiplady 1996; Philip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm.). Following the molt, large numbers of Steller's eiders are known to over winter in near-shore marine waters of the Alaska Peninsula, Aleutian Islands, Kodiak Archipelago, and the Kenai Peninsula (e.g., within Kachemak Bay).

<u>Molt Distribution</u> - After breeding, Steller's eiders move to marine waters where they undergo a flightless molt for about 3 weeks. The majority is thought to molt in four areas along the Alaska Peninsula: Izembek Lagoon (Metzner 1993; Dau 1991; Laubhan and Metzner 1999), Nelson Lagoon, Herendeen Bay, and Port Moller (Gill and others 1981; Petersen 1981). Additionally, smaller numbers are known or thought to molt in a number of other locations along the western Alaska coast, around islands in the Bering Sea, along the coast of Bristol Bay, and in smaller lagoons along the Alaska Peninsula (Swarth 1934; Dick and Dick 1971; Petersen and Sigman 1977; Wilk and others 1986; Dau 1987; Petersen and others 1991).

<u>Winter Distribution</u> - Following the molt many, but not all, Steller's eiders disperse from major molting areas to other portions of the Alaska Peninsula and Aleutian Islands. Winter ice formation often temporarily forces birds out of shallow protected areas such as Izembek and Nelson Lagoons. During the winter, this species congregates in select near-shore waters throughout the Alaska Peninsula and the Aleutian Islands, around Nunivak Island, the Pribilof Islands, the Kodiak Archipelago, and in Kachemak Bay (Larned 2000a, Bent 1987, Agler and others 1994, Larned and Zwiefelhofer 1995).

Larned (2000b) did not see Steller's eiders along most of the Alaska Peninsula coastline he surveyed during winter. Most of the birds were concentrated within relatively small portions of the coastal waters. Much of the population, detected during spring migration, was not detected on this winter survey. We believe this was because many Steller's eiders winter farther west in the Aleutian Islands and/or along the south side of the Alaska Peninsula.

<u>Spring Migration</u> - In the spring, Steller's eiders form large flocks along the north side of the Alaska Peninsula and move east and north (Larned and others 1993, Larned 1998, Larned 2000b).

Spring migration usually includes movement along the coast, although birds may take shortcuts across water bodies such as Bristol Bay (William Larned, US Fish and Wildlife Service, Migratory Bird Management Division, pers. comm.). Interestingly, despite many daytime aerial surveys, Steller's eiders have never been observed during migratory flights (William Larned, US Fish and Wildlife Service, Migratory Bird Management Division, pers. comm.). Larned (1998) concluded that Steller's eiders show strong site fidelity to "favored" habitats during migration, where they congregate in large numbers to feed before continuing their northward migration.

The number of Steller's eiders observed in each site during migration surveys should be considered a minimum estimate of the number of eiders that actually use these sites during migration. These data represent eider use during a snapshot in time, when in reality, a stream of eiders likely flows into and out of these sites throughout the migration season. The spring migration survey was not intended to document the intensity of use of any particular site by Steller's eiders, but was designed to monitor the entire population of Steller's eiders and other sea ducks during the spring migration.

Because the spring Steller's eider aerial survey was not intended to quantify use of any particular area by Steller's eiders during spring migration, care must be taken in interpreting the results with this purpose in mind. For example, Steller's eider use of habitat near Ugashik and Egegik Bays was documented in 1992, 1993, 1997, and 1998 (Larned and others 1993, Larned 1998). However, in 2000, no Steller's eiders were observed there (Larned 2000b). In fact, no Steller's eiders were observed from the Cinder River Sanctuary to Cape Constantine; an expanse of approximately 110 miles of coastline which encompasses these bays and which has had several thousand Steller's eiders documented in previous years (Larned and others 1993, Larned 1998). However, 15,000 Steller's eiders were observed south of this area and were distributed between Port Heiden and Port Moller (Larned 2000b). Three days later, about 43,000 Steller's eiders were observed south of Port Moller (Larned 2000b). The birds were, in essence, stacking up behind Port Moller, or were otherwise phenologically late in their migration relative to the previous few years. Regardless, survey results from that year suggested low use of habitats north of Port Moller, even though the birds that were counted south of Port Moller presumably used those more northerly habitats following the conclusion of the spring aerial survey.

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 and others 1993, Larned 1998, and Larned 2000b).

<u>Summer Distribution in Southern Alaska</u> - A small number of Steller's eiders are known to remain along the Alaska Peninsula and Kachemak Bay during the summer; approximately 100 have been observed in Kachemak Bay, while a few may spend the summer at Izembek Lagoon (Chris Dau, US Fish and Wildlife Service, Migratory Bird Management Division, pers. comm.).

Site Fidelity

Steller's eiders appear to show site fidelity at different spatial scales during different times of the year. There is good evidence of fidelity to molting sites in this species. About 95 percent of recaptured molting Steller's eiders are recaptured at the same site at which they were banded (Flint and others 2000). Flocks of Steller's eiders make repeated use of certain areas between years (Larned 1998), although it is unknown to what extent individuals display repeated use of these areas.

Female philopatry to breeding grounds in waterfowl species is high. Female waterfowl tend to return to the area where they hatched for their first nesting effort, and subsequently tend to return to the same area to breed in the following years (Anderson and others 1992). Despite having had only a few opportunities to observe Steller's eiders breeding on the Y-K Delta, we have observed philopatry displayed by a female Steller's eider there; one individual chose nest sites in two consecutive years that were about 124 m apart (Paul Flint, US Geological Survey, Alaska Science Center, pers. comm.). Banding data from the Barrow area suggests some level of site fidelity for Steller's eiders breeding there as well (Quakenbush and others 1995; Phillip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm.). Interestingly, natal philopatry has not been observed in Steller's eiders nesting in Russia (D. Solovieva, Zoological Institute, Russian Academy of Science, pers. comm.).

Further evidence of breeding site fidelity is found in other sea ducks. Female spectacled eiders did not move between general nesting areas (coastal versus interior) between years (Scribner and others 2000). In addition, mitochondrial DNA analysis indicates that female spectacled eiders tend to return to their natal breeding area once they are recruited to the breeding population (Scribner and others 2000). Natal, breeding, and winter philopatry in other sea ducks has also been documented (Dow and Fredga 1983, Savard and Eadie 1989, Robertson 1997, Robertson and others 1999).

Preliminary data from radio transmitters placed on 23 Steller's eiders captured in Captain's Bay and around Amaknak Island (near Dutch Harbor) in spring 2001 also reveal that eiders show site fidelity to general wintering areas (USGS 2001). Steller's eiders remained in the general vicinity from which they were initially captured from mid-February to mid-March 2001 when the radio transmitters stopped working (Paul Flint, US Geological Survey, Alaska Science Center, pers. comm.). The birds marked in Captain's Bay were never detected outside of the area that the flock was observed using. Birds marked around Amaknak Island remained in the general area, but appeared to use a larger home range. Satellite telemetry data indicated that two tagged Steller's eiders used an area of only a few square kilometers from November through Feburary (Philip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers.comm.). Although further investigation is needed, preliminary studies suggest that Steller's eiders show high site fidelity at over wintering sites, at least within one winter season. Whether Steller's eiders show fidelity to over wintering sites between years remains unknown.

We note that site fidelity has been observed in wintering harlequin ducks; they showed strong site fidelity for short stretches (5 km) of coastline (Cooke and others 2000). Robertson and others (1999) concluded that strong site tenacity suggests that local knowledge of an area is valuable and may help ensure high survival of individuals remaining in a familiar site. They suggest that site fidelity would be expected of long-lived species that are sensitive to adult mortality and depend, at least in part, upon habitat stability for survival.

Population Structure

Genetic analysis of vertebrate populations suggests that there are often genetic gradients or differences that correspond to the geographic distribution of the species (Lande and Barrowclough 1987). The Alaska breeding population of Steller's eiders may contain unique geographic sub-populations because of: (1) the distance between breeding populations on the Y-K Delta and the ACP [about 804 kilometers (500 miles)], and (2) the anticipated site fidelity of nesting adult females (Anderson and others 1992). The similarly distributed North Slope and Y-K Delta populations of spectacled eiders possess distinct mitochondrial DNA markers, implying limited maternal gene flow between these two areas for that species (Scribner and others 2000).

Food Habits

Steller's eiders employ a variety of foraging strategies that include diving to a maximum depth of at least 9 meters (30 feet), bill dipping, body tipping, and gleaning from the surface of water, plants, and mud. During the fall and winter, Steller's eiders forage on a variety of invertebrates that are found in near-shore marine waters (Metzner 1993, Petersen 1981, Bustnes and others 2000). Esophageal contents from 152 Steller's eiders collected at Izembek Lagoon, Kinzarof Lagoon, and Cold Bay, Alaska, indicate Steller's eiders forage on a wide variety of invertebrates (Metzner 1993). According to Metzner (1993), marine invertebrates accounted for the majority of the Steller's eider diet (92%, aggregate dry weight). In addition, occurrence of shell-free prey (e.g., Crustacea, Polychaeta) predominated, compared to that of food items with shells (Metzner 1993). Metzner (1993) concluded that Steller's eiders were opportunistic generalists, foraging primarily on fauna associated with eelgrass beds in Izembek Lagoon and Kinzarof Lagoon, and infauna, epibenthos, and highly mobile fauna. During molt, Steller's eiders were found to have consumed blue mussel (*Mytilus edulis*), other bivalves (e.g. *Macoma balthca*), and amphipods (a small crustacean). They were also found to have consumed more blue mussels while growing wing-feathers (Petersen 1981).

In northern Norway, 31 species were identified as Steller's eider winter food items; 13 species of gastropods (68.4% of total number of items), four species of bivalves (18.5%); 12 species of crustaceans (13%); and two species of echinoderms (0.1%; Bustnes and others 2000). Juveniles sampled in this study fed more on crustaceans (x=61% aggregate wet weight) than did adults (x=26% aggregate wet weight). Examination of female Steller's eiders found dead near Barrow showed they had consumed mostly Chironomid larvae, which are the predominant macrobenthic invertebrate in arctic tundra ponds (Quakenbush and others 1995).

Predators

Predators of Steller's eiders include snowy owls (*Nyctea scandiaca*), short-eared owls (*Asio flammeus*), peregrine falcons (*Falco peregrinus*), gyrfalcon (*Falco rusticolus*), pomarine jaegers (*Stercorarius pomarinus*), rough-legged hawks (*Buteo lagopus*), common raven (*Corvus corax*), glaucous gulls (*Larus hyperboreus*), arctic fox (*Alopex lagopus*), and red fox (*Vulpes vulpes*). Quackenbush and others (1995) reported five adult male and three adult female Steller's eiders taken by avian predators in 4 years near Barrow. Predators included peregrine falcons, gyrfalcons, and snowy owls. In addition, pomarine jaegers preyed on Steller's eider eggs. On the Y-K Delta, Steller's eider nests have been destroyed by gulls (Paul Flint, US Geological Survey, Alaska Science Center, pers. comm.). In fall, winter, and spring predation can be attributed primarily to avian predators, such as bald eagles (*Haliaeetus leucocephalus*) and gyrfalcons (Chris Dau, US Fish and Wildlife Service, Migratory Bird Management Division, pers. comm.).

Population Dynamics

Population Size

Population sizes are only imprecisely known. The Pacific wintering population is estimated to be about 80,000 birds (Larned 2005). The threatened Alaska-breeding population is thought to number in the hundreds on the ACP (Larned and others 2006), and possibly tens on the Yukon-Kuskokwim Delta (USFWS, Anchorage Fish and Wildlife Field Office, Unpublished data).

<u>Yukon-Kuskokwim Delta</u> - Estimating the size of the Steller's eider breeding population in Alaska has proved difficult. Due to the low counts and high variation in counts between years during systematic surveys, an accurate/precise statistical estimate is unavailable. Aerial surveys that included the Y-K Delta but did not include the ACP indicated that the population sizes of eiders (*Polysticta stelleri* and *Somateria* spp.) had declined by 90% since 1957 (Hodges and Eldridge 1996). For the 1950s and early 1960s, the upper limit of the population, excluding the North Slope, had been estimated to be approximately 3,500 pairs (Kertell 1991). Kertell noted, however, that the population might have been smaller due to the potential restriction of nesting Steller's eiders to specific habitats. Kertell concluded that the Steller's eider had been extirpated from the Y-K Delta prior to 1990.

Since publication of Kertell (1991), a few pairs of Steller's eiders have nested on the Y-K Delta (Table 1; Paul Flint, US Geological Survey, Alaska Science Center, pers. comm. 1999; Brian McCaffery, US Fish and Wildlife Service, Y-K Delta National Wildlife Refuge, pers. comm. 2005). In no single year have biologists found more than three nests, despite extensive ground-based nest search efforts throughout nearly all of the Steller's eider critical habitat area.

Because extensive ground investigations occur over at least 1.4% of Steller's eider critical habitat on the Y-K Delta each year (Tim Bowman, US Fish and Wildlife Service, Migratory Bird Management Division, pers. comm), with additional searching occurring by crews walking to and from study sites, and because these searches have not revealed more than two Steller's eider nest in any given year, we believe the estimate of hundreds of Steller's eiders on the Y-K Delta is optimistic.

Table 1. Recent sightings of Steller's eiders on the Y-K Delta

Year	General Location	Number of Pair	Nest Detected	Number of Eggs	Fate of Nest
1994	Kashunuk River near Hock Slough	1	1	7	Destroyed by Gulls
1996	Tutakoke River	1	1	6	Unknown
1997	Tutakoke River	2	0	NA	NA
1997	Kashunuk River	1	1	6	Hatched
1998	Tutakoke River; Kashunuk River	2;1	2; 1	Unk.; 7	Destroyed; Hatched
1999	Kigigak Island	2	2	unknown	unknown
2000	Kigigak Island	2	2	unknown	unknown
2004	Kigigak Island (south central)	1	1	7	Hatched
2005	Kigigak Island (south central and west coastal)	2 probable	1	6; unknown	Abandoned; 2 ducklings observed

<u>Arctic Coastal Plain/North Slope</u> - Aerial surveys provide the best estimate of Steller's eider population size in northern Alaska; though caution must be used when interpreting results. Neither the surveys conducted by Mallek and others (2006) nor Larned and others (2006) were designed to estimate Steller's eider populations (Table 2). It is a low density species in this area and surveys are not typically flown at the optimum time for observing Steller's eiders.

The actual numbers of Steller's eider present on the North Slope during spring is probably underestimated in most years because an unknown proportion of birds are missed during aerial surveys or because the birds have not yet arrived. Conversely, the data may over estimate population size due to the periodic presence of non-breeding birds or failed breeders from other areas. For example, the second highest count from the ACP Breeding Bird Survey from 1986-2005 (2,524) occurred in 1994 when the species failed to nest in the Barrow area and remained in terrestrial (non-marine) habitats until mid-July (Quakenbush and others 2001).

The problem of Steller’s eider population estimation results from the species dispersal across a huge landscape at very low densities. In addition, the number of Steller’s eiders present on the ACP may fluctuate dramatically from year to year. Aerial surveys optimized to detect eiders have been conducted on the North Slope since 1992 (Larned and others 2006), and indicate Steller’s eiders occur at very low densities across the ACP, with a higher density in the vicinity of Barrow. Standardized ground surveys for eiders near Barrow have been conducted since 1999, and have found an average density near Barrow of 0.66 birds/ km2 (Rojek 2006). The Barrow vicinity supports the largest known concentration of nesting Steller’s eiders in North America.

Because Alaska-breeding Steller’s eiders occur at very low densities, there is not sufficient information to estimate population size or detect population trends. The mean 1992-2006 aerial-survey generated population index[1] was 116 (n=15, standard deviation sd = 204), but the range of indices in these years ranged from 20 (calculated in a year when no birds were seen) to 785 (Larned and others 2006). The most recent index (2002-2006) was 112 (n=5, sd=98). However, aerial surveys likely undercount Steller’s eiders for several reasons. An unknown number are simply missed when observers count from aircraft; this proportion varies by species and is unknown for Steller’s eiders.

[1] We present only an index (no population abundance estimate, as with spectacled eiders) because no aerial survey-ground survey correction factor has been created for Steller’s eiders on the North Slope.

Table 2. Aerial population estimates for Steller's eiders, from the North Slope (Mallek and others 2006; Larned and others 2006).

Year	Population Estimate 1986 - 2005 (Mallek and others 2006)	Population Estimate 1992 - 2006 (Larned and others 2006)	Nesting Status near Barrow 1991 – 1999
1986	0	-	-
1987	0	-	-
1988	0	-	-
1989	2002	-	-
1990	534	-	-
1991	1118	-	Nesting[1]
1992	954	0	Non-nesting[1]
1993	1313	262	Nesting[1]
1994	2524	47	Non-nesting[1]
1995	931	281	Nesting[1]
1996	2543	0	Nesting[1]
1997	1295	189	Nesting[1]
1998	281	0	Non-nesting[1]
1999	1250	785	Nesting[1]
2000	563	0	Nesting[2]
2001	176	288	Non-nesting[2]
2002	0	0	Non-nesting[2]
2003	0	93	Non-nesting[2]
2004	0	48	Non-nesting[2]
2005	110	99	Non-nesting[2]
2006	96[3]	112	Nesting[2]

[1] Quakenbush and others 2001
[2] Nora Rojek, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm. November 2, 2005
[3] Ritchie and others 2006

Additionally, because observations at Barrow indicate that many Steller's eiders vacate nesting habitat early in non-nesting years, it is possible that aerial surveys fail to detect some individuals that were present early in the season, at least in some years. Further, the concentration area at Barrow, which contains a significant proportion of Steller's eiders detected on the entire ACP in most years, may be under-sampled because: 1) the scale of the concentration is too small to be adequately represented in the sampling regime; and 2) a portion of the concentration area is excluded because the area near the Barrow airport cannot be flown due to aviation safety concerns. Due to these biases, we cannot precisely estimate Steller's eider abundance on the North Slope, but the best available information leads the Service to estimate that roughly several hundred Steller's eiders occupy the North Slope in most years. For purposes of this consultation, such as estimating incidental take, we assume that there are 500 North Slope-breeding Steller's eiders.

Population Variability
Variability in the abundance of the Alaska breeding population of Steller's eiders is not well understood. The sampling errors around our population estimates are large enough to obscure large annual population fluctuations. However, ground-based efforts in the Barrow area suggest that the local breeding populations there fluctuate dramatically (Quakenbush and others 1995). Indeed, during some years, as in 2000 and 2002, Steller's eiders completely forego nesting in this area (Philip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm.).

Population Stability
The Steller's eider is a relatively long-lived species. Such species do not typically display highly variable populations. That Steller's eiders completely forego nesting in some years near Barrow is consistent with the reproductive strategy for a long-lived species (Begon and Mortimer 1986). However, mortality factors may be undermining this species' ability to maintain a stable population.

The population of Steller's eiders molting and wintering along the Alaska Peninsula appears to be declining (Flint and others 2000, Larned 2000b). In addition, comparison of banding data from 1975 -1981 to 1991-1997 indicates a reduction in Steller's eider survival over time (Flint and others 2000). Population models for other waterfowl applied to this species indicate that the observed reduction in annual survival over time would have a substantial negative effect on populations (Schmutz and others 1997, Flint and others 2000). If this decline is caused by something in the marine environment, it is reasonable to conclude that the Alaska breeding population and Asia breeding population are being affected similarly.

Status and Distribution
Reasons for Listing
The Alaska breeding population of Steller's eiders was listed as a threatened species on June 11, 1997 (USFWS 1997). It was listed due to (1) its recognition as a distinct vertebrate population segment, (2) a substantial decrease in the species' nesting range in Alaska, (3) a reduction in the number of Steller's eiders nesting in Alaska, and (4) the vulnerability of the remaining breeding population to extirpation (USFWS 1997).

Habitat Loss - The direct and indirect effects of future gas/oil development within the National Petroleum Reserve-Alaska, and future village expansion (e.g., at Barrow), were cited as potential threats to the Steller's eider (USFWS 1997). Within the marine distribution of Steller's eiders, perceived threats include marine transport, commercial fishing, and environmental pollutants (USFWS 1997).

Hunting - Although not cited as a cause in the decline of Steller's eiders, the take of this species by subsistence hunters was cited as a threat to the population of Steller's eiders near Barrow in the final rule (USFWS 1997). However, the gathering of subsistence harvest information similar to that collected from Native residents of the Y-K Delta has met with resistance from Native organizations on the ACP.

Predation - Increased predation by arctic foxes resulting from the concurrent crash of goose populations is cited as a possible contributing factor to the decline of the Steller's eider on the Y-K Delta (USFWS 1997). The potential for increased predation near villages resulting from the villages' associated gull and raven populations was also cited as a potential threat to this species (USFWS 1997).

Lead Poisoning - The presence of lead shot in the nesting environment on the Y-K Delta was cited as a continuing potential threat to the Steller's eider. The Service is progressing in its efforts to enforce a nationwide ban on lead shot on the ACP (USFWS 1997).

Ecosystem Change - Direct and indirect changes in the marine ecosystem caused by increasing populations of Pacific walrus (*Odobenus rosmarus*), gray whale (*Eschrichtius robustus*), and sea otter (*Enhydras lutris*), were cited as potential causes of the decline of Steller's eiders. Subsequent declines in sea otter populations (65 FR 67343) and continuing declines in Steller's eider populations suggest that otters were not responsible for a decline in eider numbers.

In addition, changes in the commercial fishing industry were also cited as perhaps causing a change in the marine ecosystem with possible effects upon eiders (USFWS 1997). However, we are unaware of any link between changes in the marine environment and contraction of the eider's breeding range in Alaska (USFWS 1997).

Range-wide Trend

Populations of Steller's eiders molting and wintering along the Alaska Peninsula have declined since the 1960s (Kertell 1991), and appear to be in continued decline (Flint and others 2000, Larned 2002). Annual spring aerial surveys provide an index of the Pacific Steller's eider population. These long term survey data suggests a 3.8% annual decline in migrating Steller's eiders (R^2 = 0.44; Larned 2005). In addition, comparison of banding data from 1975 -1981 to 1991-1997 indicates a reduction in Steller's eider survival over time (Flint and others 2000).

The Steller's Eider Recovery Plan (USFWS 2002) establishes criteria for reclassifying the species from threatened to endangered as follows:

"The Alaska-breeding population will be considered for reclassification from Threatened to Endangered when:

- The population has $\geq$ 20% probability of extinction in the next 100 years for 3 consecutive years; OR
- The population has $\geq$ 20% probability of extinction in the next 100 years and is decreasing in abundance."

IUCN status: Based on the IUCN (2001), the North American breeding population of Steller's eiders belong in the category of Endangered (EN). In the nomenclature used by IUCN, the following is the justification for this categorization: EN A1b+A2+B1b(v)c(iv)+C1 (Figure 2).

Threats Not Assessed At the Time Of Listing
Chronic Petroleum Spills - The chronic release of petroleum products near large concentrations of Steller's eiders is not a new threat as much as it is a newly realized threat. The gregarious behavior of Steller's eiders during a spill event may result in acute and/or chronic toxicity in large numbers of birds. Indeed, Larned (2000b), expressed concern for the survival and reproductive success of the large number of Steller's eiders observed in harbors.

A life-history strategy of long life and low annual reproductive effort would be expected to evolve under conditions of predictable and stable non-breeding environments (Sterns 1992). The life history strategy of the Steller's eider seems to fit this model. That is, the Steller's eider is long-lived, has low annual recruitment, and winters in apparently productive and reasonably stable near-shore marine environments. Because the Steller's eider is relatively small bodied and winters at northern latitudes, it may do so near the limits of its energetic threshold. Harlequin ducks and long-tailed ducks exist near their energetic limit in such climates (Goudie and Ankney 1986), and the Steller's eider is intermediate in size to these two species. Therefore, environmental perturbations that reduce prey availability or increase the species energetic needs may result in harm. Fuels and oils are toxic to Steller's eiders (Holmes and others 1978, Holmes and others 1979, McEwan and Whitehead 1980, Leighton and others 1983, Holmes 1984, Leighton 1993, Rocke and others 1984, Yamato and others 1996, Glegg and others 1999, Esler and others 2000, Trust and others 2000) and their prey (e.g., amphipods and snails; Newey and Seed 1995 as in Glegg and others 1999, Finley and others 1999). Therefore, we believe that spilled petroleum is likely to adversely affect Steller's eiders.

Seafood Processor Organic Waste - Discharge from seafood processors may affect the water column, sea floor, or shore directly or indirectly through burial and smothering, putrification and decay, deoxygenation, nutrient loading and alteration of habitats, aquatic communities and food webs. Although wave action in shallow, near shore habitat may keep particles suspended and prevent waste deposition, contaminants, parasites, viruses, and other pathogens may be present and/or concentrated in these wastes and may bio-accumulate in prey items consumed by eiders.

Figure 2. IUCN justification for the EN categorization for Steller's eiders

A. Reduction in population size based on any of the following:

1. An estimated population size reduction of ≥ 70% over the last three generations (for Steller's eiders, three generations equals about 25.5 years).

   a. An index of abundance appropriate to the taxon.

      Evidence: Larned and others (2003) reported a 61% decline over 10 years in the wintering population of Steller's eiders. Extrapolating this 10 year / 61% decline back in time would imply that the population declined by at least 70% in the past 25.5 years. We believe recent survey data suggests that this criterion for classification as endangered is satisfied.

A. Reduction in population size based on any of the following:

2. An observed, estimated, inferred or suspected population size reduction of 50% over the last three generations.

   Evidence: Based on population models (USFWS, Anchorage Fish and Wildlife Field Office, unpublished data 2003), and using a beginning population of 1106 Steller's eiders (mean of past 10 years breeding surveys) and a population decline of 7.6% annually (Larned 2002), we expect an 86% decline in the next 25 years. We believe recent survey data suggests that this criterion for classification as endangered is satisfied. If current population trends hold, Steller's eiders will have exceeded the 50% loss criterion in just 10 years.

B. Geographic range in the form of either extent of occurrence or area of occupancy.

1. Extent of occurrence estimated to be less than 5000 km^2 and at least two of a-c:

   b. Continuing decline, observed, inferred or projected in any of the following

      i. number of mature individuals

   c. Extreme fluctuations in any of the following:

      ii. number of mature individuals

      Evidence: Because of the large geographic extent over which this species breeds, it is unlikely that the North American Breeding population of Steller's eiders will satisfy this classification criterion unless their breeding range becomes or is determined to be restricted to the "Barrow Triangle". Ritchie and King (2002) reported that the area of the Barrow triangle is approximately 2757 km^2. We believe that available evidence suggests that the majority of Alaska breeding Steller's eiders do nest within the Barrow triangle. However, we also acknowledge occasional nesting records outside of this area.

C. Population size estimated to number fewer than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within five years or 2 generations (17 years).

   Evidence: The current population estimate for Alaska breeding Steller's eiders (1106) is an average of counts from the last 10 years of surveys of the Arctic Coastal Plain during the nesting season. In the past 10 years there has been a 55% decline in wintering Steller's eiders (Larned 2002). We believe recent survey data suggests that this criterion for classification as endangered is satisfied.

Increased Risk of Lead Poisoning – Because the Steller's eider continues feeding near the nesting site before and during incubation (D. Solovieva, Zoological Institute, Russian Academy of Science, pers. comm.), it may be subjected to an increased risk of exposure to lead shot over other waterfowl species that largely forego feeding at this time. For comparison, spectacled eiders do not seem to engage in feeding activities as much as Steller's eiders once breeding has commenced, however, spectacled eiders have been observed to have higher rates of exposure to lead than any species sampled on the Y-K Delta (Flint and others 1997). The proportion of spectacled eiders on the Y-K Delta's lower Kashunuk River drainage that contained lead shot in their gizzards was high (11.6%, n = 112) compared to other waterfowl in the lower 48 states from 1938-1954 (8.7%, n = 5,088) and from 1977-1979 (8.0%, n = 12,880). Blood analyses of spectacled eiders indicated elevated levels of lead in 13% of pre-nesting females, 25.3% of females during hatch, and 35.8% of females during brood rearing. Nine of 43 spectacled eider broods (20.9%) contained one or more ducklings exposed to lead by 30 days after hatch (Flint and others 1997). Thus, if spectacled eiders have experienced population level effects on the Y-K Delta due to lead poisoning, then Steller's eiders may have experienced similar, or even greater lead-induced effects.

Collisions with Manmade Structures - Steller's eiders have been documented to collide with wires, communication towers, boats, and other structures (Table 3). During a 4-year period near Barrow, at least one adult Steller's eider female died from striking a wire and another adult Steller's eider was suspected to have died from striking a radio tower (Quakenbush and others 1995). In addition, large numbers of Steller's eiders are known to have collided with communication towers in the wintering area along the Alaska Peninsula.

"Bird storms" are a well-documented occurrence within the commercial crab fishery fleet, a result of their use of bright lights during inclement nighttime weather. In December 1980 or 1981, "at least 150" dead eiders (species unknown) were reported to be on the deck of the M/V *Northern Endeavor* the morning after the vessel, with crab lights illuminated, anchored on the Bering Sea side of False Pass (USFWS, Anchorage Fish and Wildlife Field Office, unpublished data). Based on the time of year and location, we assume these to be Steller's eiders. Two Steller's eiders died after striking the crab lights of the P/V *Wolstad* on February 15, 1994; no additional information was provided with this report. One male Steller's eider landed on the deck of the *Elizabeth F* on February 14, 1997, at 11:36 pm; another male Steller's eider struck the vessel and died the following day at 5:00 pm. Three spectacled eiders died after striking a Coast Guard cutter conducting sampling in the Bering Sea in March 2001.

Between September 26, 2001, and October 29, 2001, the Northstar facility on the North Slope of Alaska experienced 18 sea duck mortalities and one sea duck injury due to collisions with facility infrastructure. Sixteen dead eiders of unknown species were found on October 28, 2001, on the Endicott spur-drilling island. The actual number of birds injured and killed through collisions with manmade structures is likely higher; many injured and killed birds are believed to go undetected, unreported, or become scavenged before humans detect them. Preliminary data from a scavenging trial in Cold Bay, Alaska suggests that carcass removal rate from scavengers could be as high as 50% per 24 hours (USFWS, Anchorage Fish and Wildlife Field Office, Unpublished data, 2007).

Stochastic Events - The small population size of the Steller's eiders on the Y-K Delta and the ACP may put them at risk of the deleterious effects of demographic and environmental stochasticity. Demographic stochasticity refers to random events that affect the survival and reproduction of individuals (e.g., shifts in sex ratios, striking wires, being shot, oil/fuel spills; Goodman 1987). Environmental stochasticity is due to random, or at least unpredictable, changes in factors such as weather, food supply, and populations of predators (Shaffer 1987). As discussed by Gilpen (1987), small populations will have difficulty surviving the combined effects of demographic and environmental stochasticity. The risk of local extirpation is probably highest for Steller's eiders nesting on the Y-K Delta due to the low number of birds that breed there.

The world population of Steller's eiders is probably not at high risk of extinction due to environmental stochasticity alone. Local groups of wintering birds, however, may be vulnerable to starvation due to stochastic events (e.g., unusually heavy ice-cover in their feeding habitats).

Allee Effect - "Allee effect" refers to the destabilizing tendency associated with inverse density-dependence as it relates to population size and birth rate. One form of this occurs when the ability to find a mate is diminished (Begon and Mortimer 1986). For example, if the sex ratio of a population significantly shifts from a normal condition for a species, the ability of adults to produce young may diminish. For the Steller's eider, the higher mortality rate of males (Flint and others 2000) may result in a lower number of pairs returning to nest (i.e., adult females unable to find a mate are effectively removed from the breeding population).

The annual survival rate for Steller's eiders molting and wintering in Alaska is estimated to be 0.899 ± 0.032 for females and 0.765 ± 0.044 for males (Flint and others 2000). At this estimated annual survival rate, about 39 percent of the females of a cohort will reach 10 years of age, while only about 7% of the males will survive for 10 years.

Table 3. Summary of known collisions of eiders with structures and vessels (USFWS, Anchorage Fish and Wildlife Field Office, Unpublished data, 2007).

SEASON/ YEAR	TYPE	NUMBER OF BIRDS DEAD OR INJURED	LOCATION	COMMENTS
December 1980	Collision with vessel M/V Northern Endeavor	At least 150 Steller's eiders	False Pass (Bering Sea side)	Crab lights illuminated, stormy night
February, 1991	Collision with vessel P/V Wolstad (State Protection Patrol Vessel	Two Steller's eiders	Unknown	Crab lights illuminated
February, 1997	Collision with vessel Elizabeth F	Two Steller's eiders	Unknown	One bird struck vessel on Feb. 14 and the second struck the vessel on Feb. 15.
April, 2003	Collision with power line	One Steller's eider	Bristol Bay Coast, near the intersection of the road to lake Camp and the road to Rapids Camp	Rainy with low ceiling. Biologist in the area believe this happens much more than is seen or reported.
September /October, 2001	Collision with oil rigs	19 Sea Ducks (king and common eiders and long-tailed ducks) and 16 eiders (species unknown)	North Slope	At Endicott spur drilling island, foxes had already been on the eiders (approximately 24 hours post-collision)
Pre 1974 and 1983	Collision with Grant Point DEW site tower	90 and 38 (respectively) Steller's eiders	Izembek Lagoon, Alaska Peninsula	Strikes occurred during low viability events and storms, primarily in winter. More individual strike of Steller's eiders anecdotally reported from this site.
Unknown	Collision with vessel	Many Steller's eiders	Nelson Lagoon, Alaska Peninsula	Villager reported to AFWFO personnel that he recalls sweeping Steller's eiders off the deck of his fishing boat.

Table 3 (Continued). Summary of known collisions of eiders with structures and vessels.

SEASON/ YEAR	TYPE	NUMBER OF BIRDS KNOWN DEAD OR INJURED	LOCATION	COMMENTS
Unknown	Collision with power line	150 Steller's eiders	Pilot Point, Alaska Peninsula	Pilot Point resident, responsible for erecting power line, recalls that shortly after he put it up about 150 Steller's eiders flew into it and died. The power line runs approximately 600 feet along the shoreline.
October, 2002	Collision with vessel F/V Sea Storm	6 sea birds, 2 positively identified as spectacled eiders	Eastern Bering Sea: 62 59.741N 172 30.366W	Stormy weather conditions, blowing snow and whiteout conditions. Wind was 25-30 knots. AFWFO personnel skinned one of the recovered carcasses and noted massive internal injuries throughout neck and torso. Leg and wing broken.

The observed difference in annual survival between sexes may be manifested in a skewed sex ratio. Female Steller's eiders notably out-numbered male eiders on winter surveys of three areas during January, February, and March (Lanctot and King 2000a). In waters off Unalaska and False Pass, female Steller's eiders comprised 63 and 69 percent, respectively, of Steller's eiders observed (N = 2,053 and 114 respectively) (John Burns, U.S. Army Corp of Engineers, pers. comm.; Lanctot and King 2000). At Akutan Harbor, the combined female to male sex ratio for all surveys was approximately 3 to 1 (n = 590; Lanctot and King 2000). Band recoveries reported by Dau and others (2000) also suggest a shift in Steller's eider sex ratios through time (Table 4), however, in photographs taken of over 13,000 Steller's eiders at Izembek Lagoon in January, 2002, 61% were classified as males (Chris Dau, US Fish and Wildlife Service, Migratory Bird Management Division, pers. comm.). Furthermore, females represented only 38% and 21% of Steller's eiders captured at Nelson Lagoon over a 3-year period (Flint and others 2000). This suggests that spatial segregation among sexes, during winter, may lead to assumptions of skewed sex ratio depending on areas surveyed.

Observations of a skewed sex ratio in Steller's eiders are inconsistent across the range of the species (Table 5). However, if Dau's time series data from Izembek Lagoon are correct, then the skew towards females are in stark contrast to that which is typical for many other Anatinae, where an excess of males is the norm (Johnsgard 1994). If an excess of females does exists throughout the species range (as opposed to just at some locations) then the biased sex ratio may have implications regarding reproductive potential. Although our limited observations and Dau and others's (2000) banding data suggest that a biased sex ratio exists for this species, we do not know if this biased sex ratio exists range wide, nor do we know what may be causing it.

Table 4. Shifting sex ratio of Steller's eiders at sample area No. 1 in Izembek Lagoon. Data used are from Dau and others (2000).

Years	Female	Male	Sample Size	Percent Male
1961-1966	271	566	837	68%
1968	60	85	145	59%
1974-1981	3576	2197	5773	38%
1991-1997	5971	708	6779	11%

Table 5. Observed sex ratios of Steller's eiders in their fall and winter range.

Location	n	Female	Male	Year
Unalaska	2,053	63	37	2000
False Pass	114	69	31	2000
Akutan	590	67	33	2000
Izembek	52 flocks	39	61	2002
Nelson Lagoon	11,961	38	62	1995-1997
Nelson Lagoon	14,940	21	79	1995-1997

STATUS OF THE SPECIES - Northern Sea Otter (*Enhydra lutris kenyoni*)

Species Description

The southwestern Distict Population Segement (DPS) of the northern sea otter was listed as threatened on August 9, 2005 (70 FR 46366). Critical habitat has not yet been designated. The sea otter is a mammal in the family Mustelidae and it is the only species in the genus *Enhydra*. It is the smallest marine mammal in the world, except for the South American marine otter (*Lontra* (= *Lutra*) *felina*) (Reidman and Estes 1990). Adult males average 130 centimeters (4.3 feet) in length and 30 kilograms (66 pounds) in weight; adult females average 120 centimeters (3.9 feet) in length and 20 kilograms (44 pounds) in weight (Kenyon 1969). The northern sea otter in Russian waters (*E. l. lutris*) is the largest of the three subspecies, characterized as having a wide skull with short nasal bones (Wilson and others 1991). The southern sea otter (*E. l. nereis*) is smaller and has a narrower skull with a long rostrum and small teeth. The northern sea otter in Alaska (*E. l. kenyoni*) is intermediate in size and has a longer mandible than either of the other two subspecies. Sea otters lack the blubber layer found in most marine mammals and depend entirely upon their fur for insulation (Riedman and Estes 1990). Their pelage consists of a sparse outer layer of guard hairs and an underfur that is the densest mammalian fur in the world, averaging more than 100,000 hairs per square centimeter (645,000 hairs per square inch; Kenyon 1969). As compared to pinnipeds (seals and sea lions) that have a distinct molting season, sea otters molt gradually throughout the year (Kenyon 1969).

Life History

Longevity

The maximum life span of a wild sea otter is believed to be 23 years (Nowak 1999).

Energetics

Sea otters have a relatively high metabolic rate as compared to land mammals of similar size (Costa 1978; Costa and Kooyman 1982, 1984). To maintain the level of heat production required to sustain them, sea otters eat large amounts of food; estimated at 23– 33 percent of their body weight per day (Riedman and Estes 1990).

Age to Maturity

Male sea otters appear to reach sexual maturity at 5–6 years of age (Schneider 1978, Garshelis 1983). The average age of sexual maturity for female sea otters is 3–4 years, but some appear to reach sexual maturity as early as 2 years of age.

Reproductive Strategy

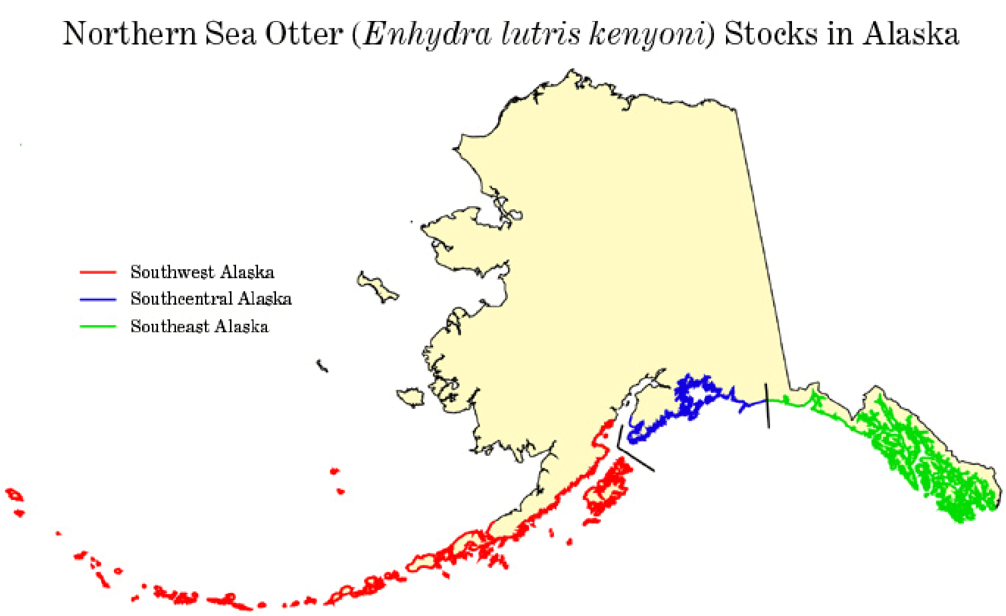
The presence of pups and fetuses at different stages of development throughout the year suggests that reproduction occurs at all times of the year. Most areas that have been studied show evidence of one or more seasonal peaks in pupping (Rotterman and Simon-Jackson 1988). Similar to other mustelids, sea otters can have delayed implantation of the blastocyst (developing embryo) (Sinha and others 1966). As a result, pregnancy can have two phases: from fertilization to implantation, and from implantation to birth (Rotterman and Simon-Jackson 1988). The average time between copulation and birth is 6–7 months. Female sea otters typically will not mate while accompanied by a pup (Lensink 1962; Kenyon 1969; Garshelis and others 1984). The interval between pups is typically 1 year.

Recruitment
Estimation of recruitment of sea otters into a population is difficult for a host of reasons, including: 1) asynchronous pupping; 2) inability to externally distinguish males from females and juveniles from adults in the field; and 3) inability to distinguish range expansion from increased density within areas of established range. For long lived species, we expect that survivorship of offspring is related to maternal age and experience, and that recruitment rate is more sensitive than survival rate to environmental fluctuations (Eberhardt 1977).

Distribution
E. l. kenyoni, also known as the northern sea otter, has a range that extends from the Aleutian Islands in southwestern Alaska to the coast of the State of Washington; The southernmost extent of the range of *E. l. kenyoni* is in Washington state and British Columbia, and is the result of translocations of sea otters from Alaska between 1969 and 1972 (Jameson and others 1982).

Three stocks of sea otters are recognized in Alaska: southwestern, southcentral and southeastern stocks (Figure 3). The southwest Alaska population ranges from Attu Island at the western end of Near Islands in the Aleutians, east to Kamishak Bay on the western side of lower Cook Inlet, and includes waters adjacent to the Aleutian Islands, the Alaska Peninsula, the Kodiak archipelago, and the Barren Islands (USFWS 2005).

Figure 3. Northern sea otter stocks in Alaska.



Movement Patterns

Movement patterns of sea otters have been influenced by the processes of natural population recolonization and the translocation of sea otters into former habitat. While sea otters have been known to make long distance movements up to 350 km (217 mi) over a relatively short period of time when translocated to new or vacant habitat (Ralls and others 1992), the home ranges of sea otters in established populations are relatively small.

Once a population has become established and has reached equilibrium density within the habitat, movement of individual sea otters appears to be largely dictated by environmental and social factors, environmental and social factors, including gender, breeding status, age, climatic variables (e.g., weather, tidal state, season), and human disturbance. Home range and movement patterns of sea otters vary depending on the gender and breeding status of the otter. In the Aleutian Islands, breeding males remain for all or part of the year within the bounds of their breeding territory, which constitutes a length of coastline anywhere from 100 meters (328 feet) to approximately 1 kilometer (0.62 miles). Sexually mature females have home ranges of approximately 8–16 kilometers (5–10 miles), which may include one or more male territories. Male sea otters that do not hold territories may move greater distances between resting and foraging areas than territorial males (Lensink 1962, Kenyon 1969, Riedman and Estes 1990, Estes and Tinker 1996). Juvenile males (1–2 years of age) are known to disperse later and for greater distances, up to 120 km (75 mi), from their natal (birth) area than 1-year-old females, for which the greatest distance traveled was 38 kilmeters (23.6 miles) (Garshelis and Garshelis 1984, Monnett and Rotterman 1988, Riedman and Estes 1990).

Sea otter movements are also influenced by local climatic conditions such as storm events, prevailing winds, and in some areas, tidal states. Sea otters tend to move to protected or sheltered waters (bays, inlets, or lees) during storm events or high winds. In calm weather conditions, sea otters may be encountered further from shore (Lensink 1962, Kenyon 1969). In the Commander Islands, Russia, weather, season, time of day, and human disturbance have been cited as factors that induce sea otter movement (Barabash-Nikiforov 1947, Barabash-Nikiforov and others 1968).

Site Fidelity

Sea otters usually remain within a few kilometers of their established feeding grounds (Kenyon, 1981), however, translocated populations are known to shift and expand their distribution in favorable habitats (Jameson 2002).

Population Structure

The subspecies *E. l. kenyoni* occurs from the west end of the Aleutian Islands in Alaska, to the coast of the State of Washington (Wilson and others 1991). Sea otters from the Aleutian Islands to lower western Cook Inlet are a population that differs from other sea otters in several respects. Sea otters to the west of the Aleutians are geographically separated by an expanse of approximately 320 km of open water and an international boundary, and are recognized as belonging to a different taxon, the subspecies *E. l. lutris.* Within the taxon *E. l. kenyoni*, there are physical barriers to movement across the upper and the lower portions of Cook Inlet, and there are morphological and some genetic differences between sea otters that correspond to the southwest and southcentral Alaska stocks (USFWS 2005).

Genetic analyses show some similarities between sea otters in the Commander Islands and Alaska (Cronin and others 1996), which indicates that movements between these areas has occurred, at least over evolutionary/geologic time scales. All existing sea otter populations have experienced at least one genetic bottleneck caused by the commercial fur harvests from 1741 to 1911. As part of efforts to re-establish sea otters in portions of their historical range, otters from Amchitka Island (part of the Aleutian Islands) and Prince William Sound were translocated to other areas outside the range of what we now recognize as the southwest Alaska distinct population segment, but within the range of *E. l. kenyoni* (Jameson and others1982).

Habitat

Sea otters generally occur in shallow water areas near the shoreline. They forage in waters less than 100 meters (328 feet) in depth, and the majority of all foraging dives take place in waters less than 30meters (98 feet) in depth (Bodkin and others 2004). As water depth is generally correlated with distance to shore, sea otters typically inhabit waters within 1–2 kilometers (0.62–1.24 miles) of shore (Riedman and Estes 1990).

Much of the marine habitat of the sea otter in southwest Alaska is characterized by a rocky substrate. In these areas, sea otters typically are concentrated between the shoreline and the outer limit of the kelp canopy (Riedman and Estes 1990), but can also occur further seaward. Sea otters also inhabit marine environments that have soft sediment substrates, such as Bristol Bay and the Kodiak archipelago. As communities of benthic invertebrates differ between rocky and soft sediment substrate areas, so do sea otter diets.

Food Habits

Sea otters are carnivores that primarily eat a wide variety of benthic (living in or on the sea floor) invertebrates, including sea urchins, clams, mussels, crabs, and octopus. In some parts of Alaska, sea otters also eat epibenthic (living upon the sea floor) fishes (Estes and others 1982; Estes 1990).

Sea otters are considered a keystone species, strongly influencing the species composition and diversity of the nearshore marine environment they inhabit (Estes and others 1978). For example, studies of subtidal communities in Alaska have demonstrated that, when sea otters are abundant, epibenthic herbivores such as sea urchins will be present at low densities whereas kelp, which is consumed by sea urchins, will flourish. Conversely, when sea otters are absent, grazing by abundant sea urchin populations creates areas of low kelp abundance, known as urchin barrens (Estes and Harrold 1988).

Predators

Sea otter predators include white sharks in the southern range and north to southeastern Alaska, and killer whales in all areas. Killer whales are thought to be key players in the decline of the southwestern Alaska stock of sea otters, but the extent of predation and its potential impact on the population as a whole has not been determined (Estes and others 1998). Sea otter pups may occasionally be taken by bald eagles or sea lions (Rotterman and Simon-Jackson 1988).

Population Dynamics

Population Size

Aleutian Islands - The first systematic, large-scale population surveys of sea otters in the Aleutian Islands were conducted from 1957 to 1965 by Kenyon (1969). The total unadjusted count for the entire Aleutian archipelago during the 1965 survey was 9,700 sea otters (Table 6). In 1965, sea otters were believed to have reached equilibrium densities throughout roughly one-third of the Aleutian archipelago, ranging from Adak Island in the east to Buldir Island in the west (Estes 1990). Islands in the other two-thirds of the archipelago had few sea otters, and researchers expected additional population growth in the Aleutians to occur through range expansion.

From the mid-1960's to the mid- 1980's, otters expanded their range, and presumably their numbers as well, until they had recolonized all the major island groups in the Aleutians. Although the maximum size reached by the sea otter population is unknown, a habitat-based computer model estimates that the population in the late-1980s may have numbered approximately 74,000 individuals in the Aleutians (Burn and others 2003). But in a 1992 aerial survey of the entire Aleutian archipelago, only 8,048 otters were counted (Evans and others 1997); approximately 19% fewer than the total reported for the 1965 survey. Sea otter surveys conducted during the mid-1990s also indicated substantial declines at several islands in the western and central Aleutians (Estes and others 1998).

In April 2000, 2,442 sea otters were counted; a 70% decline from the count 8 years previous (Doroff and others 2003). Along the more than 5,000 km (3,107 miles) of shoreline surveyed, sea otter density was at a uniformly low level, which clearly indicated that sea otter abundance had declined throughout the archipelago. Doroff and others (2003) calculated that the decline proceeded at an average rate of 17.5% per year in the Aleutians. In the summer of 2003, surveys indicated that the sea otter population declined by 63% at an estimated annual rate of 29% per year (Estes and others 2005).

Alaska Peninsula - Three remnant colonies (at False Pass, Sandman Reefs, and Shumagin Islands) were believed to have existed near the western end of the Alaska Peninsula after commercial fur harvests ended in 1911 (Kenyon 1969). During surveys in the late 1950s and early 1960s, substantial numbers of sea otters were observed between Unimak Island and Amak Island (2,892 in 1965) on the north side of the Peninsula, and around Sanak Island and the Sandman reefs (1,186 in 1962), and the Shumagin Islands on the south side (1,352 in 1962; Kenyon 1969). Schneider (1976) calculated an unadjusted population estimate of 11,681 sea otters on the north side of the Alaska Peninsula in 1976, which he believed to have been within the carrying capacity for that area. In 1986, it was estimated that 6,474–9,215 sea otters occurred in this area (Burn and Doroff 2005). In May 2000, an estimated 4,728 sea otters were counted on the north side of the Alaska Peninsula; a 27–49% decline from 1986 (Burn and Doroff 2005).

Estimates of sea otters occupying offshore areas on the south side of the Alaska Peninsula in 1986 (Brueggeman and others 1988) are 13,900–17,500 (Burn and Doroff 2005). A replication of this 1986 survey route during April of 2001, suggested a 93% decline in abundance (Burn and Doroff 2005).

Several island groups along the south side of the Alaska Peninsula; Pavlof and Shumagin Islands, as well as Sanak, Caton, and Deer Islands were surveyed in 1962 (1,900 otters; Kenyon 1969), in 1986, (2,122 otters; Brueggeman and others 1988) in 1989 (1,589 otters; DeGange and others 1995). There were approximately 16–28% fewer sea otters in 1995 than were reported in the earlier counts. This decrease was the first indication of a sea otter population decline in the area of the Alaska Peninsula. Sea otter counts were again conducted in these island groups in 2001, and only 405 individuals were counted (Burn and Doroff 2005); an 81% decline from the 1986 count (Brueggeman and others 1988).

In 1989, DeGange and others (1995) counted 2,632 sea otters along the southern shoreline of the Alaska Peninsula from False Pass to Castle Cape. In a repeated survey of this route in 2001, 2,651 sea otters were counted (Burn and Doroff 2005), nearly the same as the 1989 count.

The results from the different survey areas along the Alaska Peninsula indicate various rates of change. Overall, the combined counts for the Peninsula have declined by 65–72% since the mid-1980s (Table 7). The result of an adjusted estimate of sea otter counts along the Alaska Peninsula is 19,821 as of 2001.

Kodiak Archipelago - One of the remnant sea otter colonies in southwest Alaska is thought to have occurred at the northern end of the Kodiak archipelago, near Shuyak Island. In 1959, Kenyon (1969) counted 395 sea otters in the Shuyak Island area. Over the next 30 years, the sea otter population in the Kodiak archipelago grew in numbers, and its range expanded southward around Afognak and Kodiak Islands (Schneider 1976, Simon-Jackson and others 1984, Simon-Jackson and others 1985). DeGange and others (1995) surveyed the Kodiak archipelago in 1989 and calculated an adjusted population estimate of 13,526 sea otters. In 1994, there was an estimated 9,817 otters in the Kodiak archipelago (approximately 27% lower than in 1989 (Doroff and others In Prep.). A repeated survey conducted in 2001 suggested a 40% decline in from 1994 (5,893 sea otters; Doroff and others prep.). In 2004 the population size of otters in the Kodiak archipelago is estimated at 6,284. The 2004 estimate is not significantly different from the 2001 estimate ($Z = 0.24$, $p = 0.81$; Doroff and others In Prep.).

Kamishak Bay - Kamishak Bay is located on the west side of lower Cook Inlet, north of Cape Douglas. In the summer of 2002, the U.S. Geological Survey (USGS), Biological Resources Discipline conducted an aerial survey of lower Cook Inlet and the Kenai Fiords area, in part to estimate sea otter abundance in Kamishak Bay. Sea otters were relatively abundant within Kamishak Bay during the 2002 survey (6,918 otters; USGS 2002), with numerous large rafts of sea otters observed.

Our current estimate of the size of the southwest Alaska population of the northern sea otter, which includes the 2004 estimate for the Kodiak archipelago, is 41,865 animals (Table 7). This estimate is based on range-wide survey information collected from 2000–2004, and is adjusted for animals not detected. As recent site-specific surveys indicate the decline has not abated in the Aleutian archipelago and south Alaska Peninsula study areas, it is possible that the current population size is actually lower.

Table 6. Summary of northern sea otter population surveys in southwest Alaska (USFWS 2005)

Survey area	Year	Count or Estimate	Source
Aleutian Islands	1965	9,700	Kenyon (1969)
	1992	8,048	Evans and others (1997)
	2000	2,442	Doroff and others (2003)
North Alaska Peninsula Offshore Areas	1976	11,681	Schneider (1976)
	* 1986	6,474 ± 2,003 (JUN) 9,215 ± 3,709 (AUG) 7,539 ± 2,103 (OCT)	Brueggeman and others (1988) Burn and Doroff (2005)
	2000	4,728 ± 3,023 (MAY)	Burn and Doroff (2005)
South Alaska Peninsula Offshore Areas	* 1986	13,900 ± 6,456 (MAR) 14,042 ± 5,178 (JUN) 17,500 ± 5,768 (OCT)	Brueggeman and others (1988), Burn and Doroff (2005).
	2001	1,005 ± 1,597 (APR)	Burn and Doroff (2005)
South Alaska Peninsula Islands	1962	2,195	Kenyon (1969)
	1986	2,122	Brueggeman and others (1988)
	1989	1,589	DeGange and others (1995)
	2001	405	Burn and Doroff (2005)
South Alaska Peninsula Shoreline	1989	2,632	DeGange and others (1995)
	2001	2,651	Burn and Doroff (2005)
Kodiak Archipelago	1989	13,526 ± 2,350	DeGange and others (1995)
	1994	9,817 ± 5,169	Doroff and others (In Prep.)
	2001	5,893 ± 2,630	Doroff and others (In Prep.)
	2004	6,284 ± 1,807	Doroff and others (In Prep.)
Kamishak Bay	2002	6,918 ± 4,271	USGS (2002).

*Estimates recalculated by the Service (Burn and Doroff 2005) from original data of Brueggeman and others (1988).

Table 7. Recent population estimates for the northern sea otter in southwest Alaska (USFWS 2005)

Survey area	Year	Unadjusted count or estimate	Adjusted count or estimate	Reference
North Alaska Peninsula Offshore Areas	2000	4,728	11,253	Burn and Doroff (2005)
Aleutian Islands	2000	2,442	8,742	Doroff and others (2003)
South Alaska Peninsula Offshore Areas	2001	1,005	2,392	Burn and Doroff (2005)
South Alaska Peninsula Shoreline	2001 a	2,190	5,212	Burn and Doroff (2005)
South Alaska Peninsula Islands	2001	405	964	Burn and Doroff (2005)
Unimak Island	2001	42	100	Burn and Doroff (2005)
Kodiak Archipelago	2004	-	6,284	Doroff and others ((In Prep.)
Kamishak Bay	2002	-	6,918	USGS Unpublished data
Total			41,865	

Survey methods vary in different locations. Like survey efforts of most species, detection of all the individuals present is not always possible. Sea otters spend considerable time under water, and it is not possible to detect individuals that are below the surface at the time a survey is conducted. Also, observers do not always detect every individual present on the surface.

Population Variability

Difference in sampling and estimation techniques may be responsible for variabilty in some population estimates (USFWS 2005). Even with variabilty in poulation estimates, the magnitude of the decline is so great that the likelihood that the population has not declined is exceedingly small.

Population Stability
Estes (1990) estimated population growth rates ranging from 17–20 percent per year for four northern sea otter populations expanding into unoccupied habitat. While Bodkin and others (1999) also reported similar population growth rates, they also note that population growth rates in translocated populations were significantly greater than for remnant populations. After the initial period of growth, populations typically reach an equilibrium density that can be supported by the habitat (Estes 1990).

Status and Distribution
Reasons for Listing
The definition of a threatened species is one that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Recent surveys conducted in 2003 and 2004 indicate that the population decline has not abated in several areas within southwest Alaska. If the decline continues at the observed rates, the population may become extirpated throughout portions of its range within the next decade (Estes and others 2005), at which point the DPS may be in danger of extinction.

The current distribution of sea otters is different in that they occur throughout their former range, but at extremely low densities in most areas. Otters are now absent, or nearly so at some of the smaller islands in the Aleutian archipelago to the point where it is possible that Allee effects (reduced productivity at low population densities) may occur (Estes and others 2005).

Predation - The weight of evidence of available information suggests that predation by killer whales (*Orcinus orca*) may be the most likely cause of the sea otter decline in the Aleutian Islands (Estes and others 1998). Data that support this hypothesis include: (1) A significant increase in the number of killer whale attacks on sea otters during the 1990s, (Hatfield and others 1998); (2) the number of observed attacks fits expectations from computer models of killer whale energetics; (3) the scarcity of beachcast otter carcasses that would be expected if disease or starvation were occurring; and (4) markedly lower mortality rates between sea otters in a sheltered lagoon (where killer whales cannot go) as compared to an adjacent exposed bay.

The hypothesis that killer whales may be the principal cause of the sea otter decline suggests that there may have been significant changes in the Bering Sea ecosystem (Estes and others 1998). For the past several decades, harbor seals (*Phoca vitulina*) and Steller sea lions (*Eumetopias jubatus*), the preferred prey species of transient, marine mammal eating killer whales, have been in decline throughout the western north Pacific. In 1990, Steller sea lions were listed as threatened under the Act (55 FR 49204). Estes and others (1998) hypothesized that killer whales may have responded to declines in their preferred prey species, harbor seals and Steller sea lions, by broadening their prey base to include sea otters.

Subsistence Harvest - The best available scientific information does not indicate that the subsistence harvest has had a major impact on the southwest Alaska DPS of the northern sea otter. Some of the largest observed sea otter declines have occurred in areas where subsistence harvest is either nonexistent or extremely low. The majority of the subsistence harvest in southwest Alaska occurs in the Kodiak archipelago. Given the estimated population growth rate of 10 percent per year estimated for the Kodiak archipelago by Bodkin and others (1999), we would expect that these harvest levels by themselves would not cause a population decline. Subsistence harvest has reportedly removed fewer than 1,400 sea otters from the southwest Alaska DPS since 1989 (average = 85/year; range = 24 to 180/year; USFWS, Marine Mammals Management, Anchorage, Alaska, Unpublished data).

Interaction with Commercial Fisheries - While there are some fisheries for benthic invertebrates in southwest Alaska, there is little competition for prey resources due to the limited overlap between the geographic distribution of sea otters and fishing effort. In addition, the total commercial catch of prey species used by sea otters is relatively small (Funk 2003). Sea otters are sometimes taken incidentally in commercial fishing operations. Information from the NMFS list of fisheries indicates that entanglement leading to injury or death occurs infrequently in set net, trawl, and finfish pot fisheries within the range of the southwest Alaska DPS of the northern sea otter (67 FR 2410, January 17, 2002). During the summers of 1999 and 2000, NMFS conducted a marine mammal observer program in Cook Inlet for salmon drift and set net fisheries. No mortality or serious injury of sea otters was observed in either of these fisheries in Cook Inlet (Fadely and Merklein 2001). Similarly, preliminary results from an ongoing observer program for the Kodiak salmon set net fishery also report only four incidents of entanglement of sea otters, with no mortality or serious injury (Manly and others 2003).

Commercial Over-utilization - Sea otters have rebounded from the estimated 1,000–2,000 individuals that were left after the cessation of commercial hunting (USFWS 2005). Following 170 years of commercial exploitation, sea otters were protected in 1911 under the International Fur Seal Treaty, which prohibited further hunting. Currently, there is no commercial use of sea otters in the United States, and recreational, scientific, and educational uses have been regulated under the MMPA of 1972.

Habitat - At present, no curtailment of range has occurred, as sea otters still persist throughout the range of the DPS, albeit at markedly reduced densities. There is no evidence to suggest that loss of habitat has been a contributing factor in the sea otter decline (USFWS 2005).

Research - Scientific research on sea otters occurs primarily as aerial and skiff surveys, and such surveys are conducted infrequently (once every few years). When they occur, they last for very short durations of time. During the 1990s, 198 otters were captured and released as part of health monitoring and radio telemetry studies at Adak and Amchitka (T. Tinker, University of California at Santa Cruz, pers. comm.). In 2004, sea otters from the southwest Alaska DPS were captured as part of a multi-agency health monitoring study. All of the 60 otters captured in this study were released back into the wild (USFWS 2005).

Disease - Parasitic infection was identified as a cause of increased mortality of sea otters at Amchitka Island in 1951 (Rausch 1953). These highly pathogenic infestations were apparently the result of sea otters foraging on fish, combined with a weakened body condition brought about by nutritional stress. More recently, sea otters have been impacted by parasitic infections resulting from the consumption of fish waste. Necropsies of carcasses recovered in Orca Inlet, Prince William Sound, revealed that some otters in these areas had developed parasitic infections and fish bone impactions that contributed to their deaths (Ballachey and others 2002, King and others 2000).

Chronic Oiling - Traditional thinking that oil effects on sea otters is limited to short-term acute exposure of fur resulting in death from hypothermia, smothering, drowning, or ingestion of toxics during preening is being challenged. A growing body of evidence provides documentation that oil can also affect this species over the long term through interactions between natural environmental stressors, subsequently compromising the health of animals exposed to oil lingering well beyond the acute mortality phase (Peterson and others 2003). The myriad studies that have been undertaken since the 1989 Exxon Valdez Oil Spill (EVOS) provide the most comprehensive data set correlating the effects to wild populations of long-term, low-level exposure to hydrocarbons. Documenting chronic effects of EVOS on sea otters is difficult due to lack of appropriate controls and natural variability among affected resources. However, until rigorous experimental control becomes feasible in assessing the impacts of unpredictable environmental perturbations, correlates will remain our best inferential tool.

Results of several studies support the hypothesis that oil persisting in habitat and prey continues to affect sea otter recovery in Prince William Sound as sublethal doses compromise health, reproduction and survival across generations. Sea otters consuming prey that occurs in habitats that serve as repositories for residual oil have a high potential to encounter subsurface oil while excavating prey from contaminated sediments. Because invertebrates do not metabolize hydrocarbons as do vertebrates, they accumulate hydrocarbon burdens in their tissues (Short and Harris 1996). Thus, sea otters are potentially exposed to residual oil through 2 pathways: physical contact with oil while digging for prey, and ingestion of contaminated prey.

Persistent exposure of sea otters to residual oil in western PWS has been confirmed. Several authors reported higher levels of P450 1A (CYP1A), a biomarker of exposure to aromatic hydrocarbons, in sea otters sampled from oiled areas of PWS compared to animals sampled from un-oiled areas (Ballachey and others 2000a; Ballachey and others 2000b; Bodkin and others 2002).

Chronic exposure to oil may cause reduced productivity and reduce survival of young (Mazet and others 2001). Similar body lengths of sea otters that attained adulthood prior to the spill suggests that food resources were approximately equivalent between the areas before the spill occurred and implies that factors other than body condition are affecting pup survival in western PWS (Ballachey and others 2003).

Trans-generational effects may arise from direct interaction of a mutagen with the DNA of germinal cells or from selection or stochastic processes that result from living in a polluted environment, and can be expressed in populations long after removal of the causative contaminants (Bickham and Smolen 1994). Sea otters are long-lived with relatively low annual reproductive rates and high annual adult survival; factors that result in either reduced reproduction, increased mortality, or increased emigration, will eventually lead to depressed population growth rates (Riedman and Estes 1990). Finally, exposure to pollutants such as crude oil may affect sea otters at a variety of levels of organization, beginning with somatic or germinal cell mutations and leading to a cascade of alterations that go beyond the individual or community to threaten the long-term survival of the population (Bickham and others 2000).

Range-Wide Trend

Historically, sea otters occurred throughout the coastal waters of the North Pacific Ocean from the northern Japanese archipelago around the north Pacific Rim to central Baja California, Mexico. Commercial hunting of sea otters began shortly after the Bering/Chirikof expedition to Alaska in 1741. Over the next 170 years, sea otters were hunted to the brink of extinction first by Russian, and later American, fur hunters. Prior to commercial exploitation, the worldwide population of sea otters was estimated at 150,000-300,000 animals (Kenyon 1969, Johnson 1982).
Sea otters were protected from further commercial harvests under the International Fur Seal Treaty of 1911. At that time, only 13 small remnant populations are believed to have persisted. The total worldwide population at that time may have been only 1,000-2,000 animals. Two of these remnant populations (Queen Charlotte Island and San Benito islands) declined to extinction (Kenyon 1969, Estes 1980). The remaining 11 populations began to grow in number, and expanded to recolonize much of the former range. Six of these remnant populations (Rat Islands, Delarof Islands, False Pass, Sandman Reefs, Shumagin Islands, and Kodiak Island) were located within the bounds of the southwest Alaska DPS. Because of the remote, pristine nature of southwest Alaska, these remnant populations grew rapidly during the first 50 years following protection from further commercial hunting.

The available survey data indicates that the sea otter population in southwest Alaska had grown in numbers and re-colonized much of its former range by the mid- to late-1980s. At that time, the sea otter population was believed to have numbered between 92,800 - 126,900 animals in southwest Alaska.

Recent survey data indicates that sea otters have suffered drastic population declines throughout much of southwest Alaska during the past 10-15 years. The current population appears to have declined by 60-70 percent.

ENVIRONMENTAL BASELINE

The “environmental baseline” section summarizes the effects of past and present human and natural phenomena on the current status of threatened and endangered species and their habitat in the action area. The information presented here establishes the baseline condition for natural resources, human usage, and species usage in the action area that will be used as a point of comparison for evaluating the effects of the proposed action.

Assumptions Used in Analysis of Past, Present and Future Effects

Proportion of Wintering Steller’s Eiders from Listed Population

We calculate that 1% of all Steller’s eiders observed on the wintering grounds in Alaska in 2007 are from the listed Alaska breeding population (Table 2). This estimate is derived by taking the recent North Slope breeding bird estimate, adding 1 for the Y-K Delta population, and then dividing by the most recent population estimate of wintering Steller’s eiders (79,022; Larned 2005). Thus, 501 ÷ 79,022 = (0.006956 * 100) = 0.7%. This estimate is rounded up to 1%.

Temporal Distribution - Northern Sea Otters
Sea otters occupy both Akutan Harbor and Surf Bay during summer and winter and can be assumed to occupy those waters year round (Angela Doroff, US Fish and Wildlife Service, Marine Mammals Division, pers. comm.).

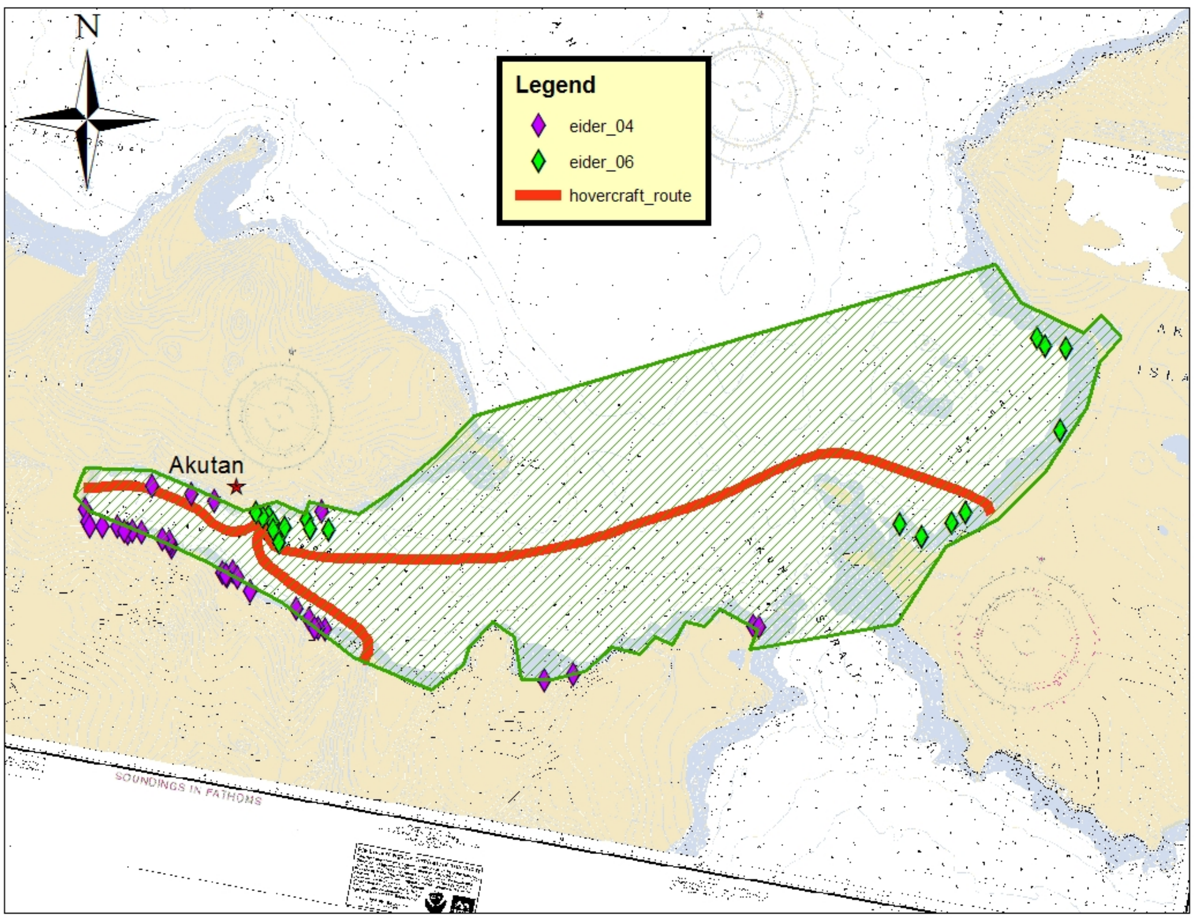
Life of the Project

We are assuming the life of the project is 20 years.

Determination of Action Area

The action area includes Akutan Harbor on Akutan Island, Surf Bay on Akun Island, and marine waters in between the islands (Figure 3).

Figure 3. Eider observations within the Action Area of the Akutan Airport project.



Status of the Species within the Action Area

Steller's eiders
Steller's eider surveys by land, skiff, and air were conducted in March 1999 (Schroeder 2001), January and February 2000 (Lanctot and King 2000a, Lanctot and King 2000b), February and March 2000 (Larned 2000), January and February 2001 (Schroeder 2001a), January, February and

March 2004 (HDR Alaska, Inc. 2004), and January, February and March 2006 (HDR Alaska, Inc. 2006). Only two surveys, Larned (2000) and HDR Alaska, Inc. (2006) included Surf Bay off Akun Island.

Service biologists recorded as many as 358 Steller's eiders in the western half of Akutan Harbor in March 1999 with the largest flocks concentrated near the entrance to the south stream at the head of the bay and smaller flocks observed along the southern shoreline. Additionally, flocks were observed in nearshore waters between Salthouse Cove and the eastern edge of the city of Akutan. Subsequent surveys of Akutan Harbor revealed similar distribution patterns.

A total of 453, 451 and 461 Steller's eiders were observed in Akutan Harbor on 23, 24 and 25 January 2000, respectively (Lanctot and King 2000a). During these surveys, eiders were consistently found in the southeast corner of Akutan Harbor and along the south side of the Harbor. Most eiders were found within 15 to 25 m of shore. As many as 125 eiders were observed in nearshore waters immediately off the community. These surveys were repeated in February and March 2000 (Lanctot and King 2000b). Total numbers of Steller's eiders were 321, 336 and 252 on 16, 18 and 19 February 2000 respectively. Distribution patterns mirrored those observed during the January of 2000 surveys with additional observations recorded in nearshore waters at Water Source Point and the shoreline east of the city of Akutan.

The Service conducted aerial shoreline surveys of areas in Akutan Harbor and Surf Bay February and March of 2000 (Larned 2000b). A total of 647 Steller's eiders were observed in Akutan Harbor and 75 in Surf Bay on 13 February 2000.

A different pattern of use was observed by HDR Alaska, Inc. in 2006. Steller's eiders were observed primarily in Akutan Harbor, specifically near the Trident seafood processor in January, 2006, but no Steller's eiders were observed in Akutan Harbor in February, 2006 (HDR Alaska, Inc. 2006). In February 2006, all Steller's eiders observed were in Surf Bay,[???] suggesting seasonal habitat use within the action area. [NOT CLEAR – two paragraphs above, eiders were seen in Akutan Harbor on 16, 18, and 19 Feb 2000??]The 2006 surveys were hampered by unfavorable weather to conduct surveys, however, so March, 2006 data is limited (Figure 4).

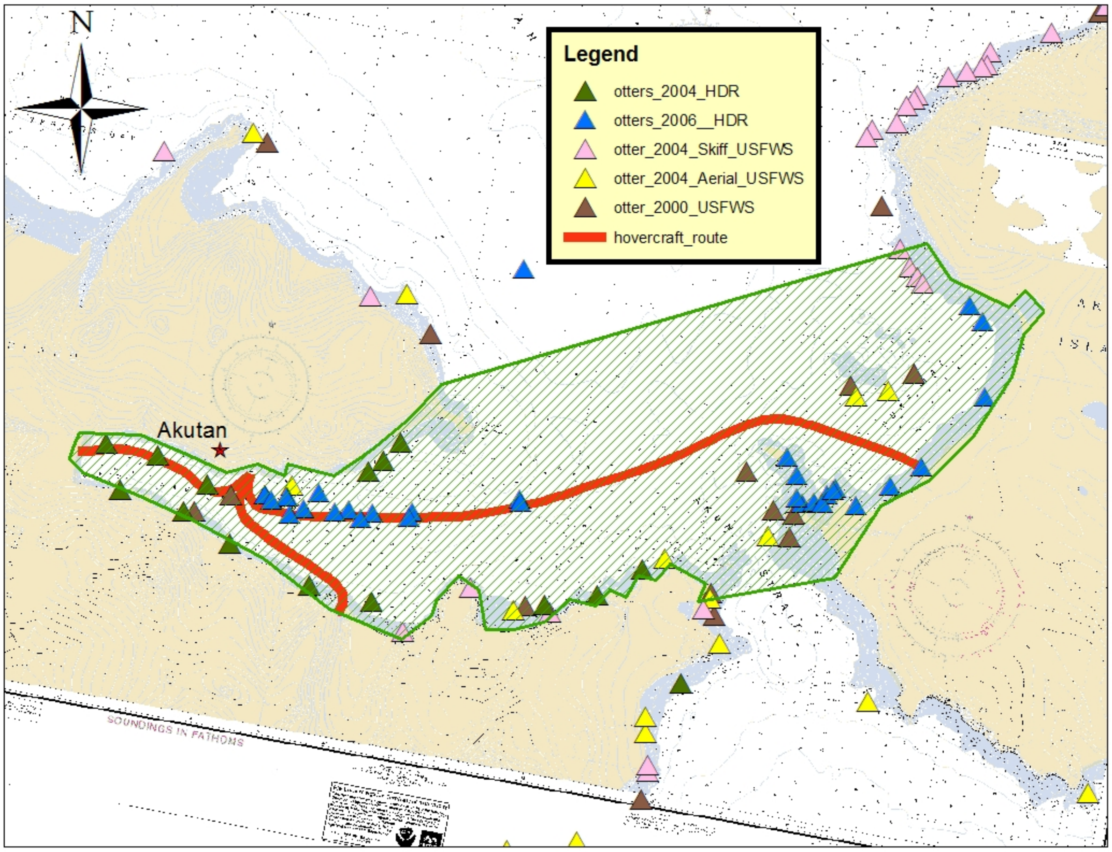
Although not designated as critical habitat, Akutan Harbor and Surf Bay contain primary constituent elements found in critical habitat. Wintering Steller's eiders occupy shallow, near-shore marine waters, usually within 400 m of shore and in water less than 10 m (30 ft) deep, where they feed on the associated invertebrate fauna and underlying benthic organisms.

Northern sea otter

Schroeder (2001) observed a raft of 18 individuals at the northwest corner of Akutan Harbor. Summer skiff and aerial surveys were conducted by the Service in 2000 and 2004 (USFWS, Marine Mammals Division, unpublished data, Anchorage, Alaska). Sea otter surveys were conducted concurrent with the Steller's eider surveys in winter 2004 and again in 2006, but Surf Bay was only surveyed in 2006 (HDR Alaska Inc. 2006)

Up to 36 sea otters have been observed in one day (HDR Alaska, Inc. 2004). They are distributed all along the shoreline of the action area, including Surf Bay at the location of the hovercraft landing area (HDR Alaska, Inc. 2006). They have also been observed within the hovercraft navigation route (Figure 4). It is likely that sea otters are using the same calm water that is desirable for operating the hovercraft.

Figure 4. Otter observations within the Action Area for the Akutan Airport Project



Factors Affecting Species' Environment in the Action Area

Seafood Processor Organic Waste

Past and present impacts to Steller's eiders and northern sea otters resulting from the seafood industry infrastructure at Akutan may be associated with: 1) the degradation of habitat due to the release of organic waste into near shore marine waters; 2) the loss of gill nets in near shore waters; 3) the accidental release of fuels into the marine environment during refueling operations; 4) the accidental release of petroleum through the release of contaminated bilge water or from grounded/sunk vessels; and 5) collisions/interactions with fishing vessels.

The Alaska Department of Environmental Conservation declared Akutan Harbor an impaired water body in 1999. The primary source of water quality degradation in the harbor is related to the discharge and accumulation of seafood processing wastes (USACE 2001). Accumulations of seafood waste particulates have been observed along the shoreline east and west of the Trident facility. The US Environmental Protection Agency has divided Akutan Harbor into two areas: the outer harbor (waters east of longitude 165°46’ W) and the inner harbor (waters west of 165°46’W; USACE 2001). The inner harbor is listed on the USEPA’s impaired water body list for total maximum daily load dissolved oxygen. Trident Seafoods usually operates 6 months a year: August, September, October, January, February, and March. By Consent Decree, Trident is required to reduce BOD 12% at their Akutan facility from 0.0937 to 0.0825 lbs BOD/lb raw pollock. Trident has four discharge lines, three of which discharge seafood-processing wastes into Akutan Harbor. Arctic Enterprise and Arctic Five are processing vessels that operate in the outer harbor under the conditions of the general permit (AKP520000). Arctic Five barges its seafood waste to the Trident facility for processing into fish meal and Arctic Enterprise barges its waste out of Akutan Harbor and discharges it according to general permit conditions.

Schroeder (2001) characterized degradation of habitat due to the release of organic waste into the near shore marine environment as including poorer water quality and decreased biological productivity, especially at the head of the bay where circulation is poor. According to dive surveys conducted in June 2000, conditions have improved since the 1980s, indicated by abundant marine organisms up to the anoxic seafood waste deposits. Additionally, spinoid polychaete worms (*Boccardia spp*) occurred in dense concentrations indicating that the site remains disturbed, but that new organic material is readily available. Schroeder (2001) concluded that sufficient oxygen was available for decomposition of the current waste input but not sufficient to aid in the decomposition of historic waste piles that remain on the Akutan Harbor seafloor.

Petroleum Spills

According to a summary by Day and Pritchard (2000) of existing information on releases of petroleum compounds in or near 10 harbors along the Alaska Peninsula and Aleutians, both the number of spills and the amount of material spilled is greatest at the three harbors that are involved in the Bering Sea bottom fish fishery, which includes Akutan Harbor. Between 1990 and 1999, a total of 11,444.5 gallons were spilled at Akutan Harbor in 35 separate spills. Akutan Harbor had the second highest mean spill size, 346.8 gallons, of the 10 harbors included in the study; in an average year, 7.4% of all spills occur at Akutan Harbor. Average size per spill in Akutan Harbor is more than 200 gallons and an average of 6.5 spills occurred annually over the 10-year study period. Based on the historical record, Day and Pritchard (2000) estimated a future release of approximately 360 gallons of petroleum product annually at Akutan Harbor.

Approximately 26 petroleum spills were reported in Akutan Harbor from 2000 to 2005. The majority of these spills were reported to have occurred from Trident Seafood Plant operations and include diesel and waste oil from the plant and plant vessels. The majority of the spills were small spills resulting from overfill of tanks and leaks in pipes (ADEC 2006). We do not know what effect the spills at Akutan Harbor have had on Steller’s eiders or northern sea otters that occur there.

Collisions with Vessels and Harbor-Related Structures

See “Life History – New Threats” for a discussion of the potential for Steller’s eiders to collide with lighted vessels and harbor infrastructure.

Sea otters within Akutan Harbor are exposed to a large number of vessels; including large and small fishing vessels, small skiffs, and barges on a daily basis. Sea otters typically respond to an approaching vessel by swimming from the area (HDR Alaska, Inc. 2006).

The collective results of all the aforementioned existing vessel uses and activities in the harbor may already be causing northern sea otters to: (1) become displaced from their feeding and resting areas; (2) increase their risk of collision with vessels; and (3) have their habitat become degraded due to the accidental release of organic waste and petroleum products into the nearshore environment, or as a result of normal operations.

Table 8. Take of Steller's eiders anticipated from actions for which formal Section 7 consultation has been completed.

ACTION	**YEAR**	**PROJECT LIFE**	**TAKE TYPE**	**TAKE LISTED**	**TAKE TOTAL**
False Pass Harbor	2000	50	Petroleum-sublethal	4	146
NPDES-GP	2000	5	Strikes-lethal	1	33
Chignik Lagoon Tank Farm	2001	40	Petroleum-sublethal	8	264
Sandpoint Harbor	2002	50	Strikes-lethal	1	30
Sandpoint Harbor	2002	50	Petroleum-sublethal	367	11
Sandpoint Harbor	2002	50	Displacement	1	30
Chignik Dock	2002	35	Petroleum-sublethal	4	150
Chignik Tank Farm	2002	30	Petroleum	5	170
Fairweather	2003		Disturbance	66	1570
Nelson Lagoon Tank Farm	2003	40	Petroleum	20	476
Nelson Lagoon Tank Farm	2003	40	Strikes	1	24
Spring Subsistence	2003	annually	Lethal	7	17
Research		annually	Lethal	2	2

Incidental Take Of Steller's Eiders Permitted For Other Federal Actions
Harbor Construction and Improvements - Construction of new, or improvements to existing, harbor facilities are associated with an increase in acute and chronic exposure to spilled petroleum compounds, and with an increase in collision potential for eiders with associated infrastructure. The Service has consulted on four harbor construction or improvement projects since 2000. Over the 50-year life of these projects, we estimate lethal and sub-lethal take of 29 listed Steller's

eiders. We estimate take in the form of displacement of one listed Steller's eider. Yearly lethal take of listed birds is estimated to be 0.58 individuals (Table 8).

Seafood Processing - The operation of seafood processing facilities is associated with habitat degradation, changes in prey abundance and availability, exposure to contaminants including petroleum compounds, and increased risk of collision with associated infrastructure. The Service has consulted on one Statewide General Permit and four individual National Pollutant Discharge Elimination System permits for seafood processing since 2000. We estimated lethal take of 1 listed Steller's eider due to strikes with infrastructure, and take in the form of displacement of 25 listed Steller's eiders. Yearly lethal take of listed birds is estimated to be 0.2 individuals for the 5-year life of the permit (Table 8).

Bulk Fuel Facilities - While upgrades to bulk fuel facilities greatly decrease the likelihood of catastrophic spills and reduce chronic contamination originating at bulk fuel storage facilities, Steller's eiders occupying habitat in the vicinity of these facilities are at continued risk of acute and chronic exposure to spilled petroleum compounds. Facilities with associated marine fueling stations pose a greater risk of discharging oil into marine waters. We estimate take in the form of harm of 33 listed Steller's eiders, and lethal take of one listed Steller's eider as a result of three bulk fuel facility upgrades consulted on since 2001. Yearly lethal take of listed birds is estimated to be 0.85 birds for the 40-year life of these projects (Table 8).

Spring Subsistence Waterfowl Harvest - In 2002, the Service proposed to open a spring/summer harvest of migratory birds which has been allowed under the amended treaty protocols with Canada and the United Mexican States. The harvest would occur within the constraints imposed by the treaties and to the extent possible, legalize the customary and traditional subsistence harvest practices of Alaskan indigenous inhabitants. The term "indigenous" has been interpreted to mean all permanent rural inhabitants regardless of race. Subsistence harvest areas have been defined to include most village areas within the Alaska Peninsula, Kodiak Archipelago, the Aleutian Islands, and areas north and west of the Alaska Range. Accidental take of adult breeding and non-breeding Steller's eiders by subsistence hunters is anticipated as a result of this action. Approximately seven listed Steller's eiders are anticipated to be taken annually as a result of the legalization of a spring subsistence migratory bird harvest (Table 8).

Research **-** We estimate that two listed Steller's eiders will be lethally taken each year as a result of research activities (Table 8).

Total take resulting from all these activities is estimated to be approximately 10 listed Steller's eiders per year When this additional level of take is incorporated into a population model in an additive fashion above estimated annual decline range wide, functional extinction (125 birds) is reached by year 30, approximately 5 years prior to that predicted by the estimated annual decline alone (USFWS 2006).

EFFECTS OF THE ACTION

"Effects of the action" refers to the direct and indirect effects of the action on the species or its critical habitat. The effects of the action will be evaluated together with the effects of other activities that are interrelated or interdependent with the action. These effects will then be added to the environmental baseline in determining the proposed action's effects upon the species or its critical habitat (50 CFR Part 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

Factors To Be Considered

The probability of Steller's eiders and northern sea otters being taken or harmed as a result of the construction and of the Akutan Airport is a function of many factors, including: 1) temporal and spatial overlap of their distributions within the area affected by disturbances associated with airport construction and operation; 2) the nature and duration of effects; and 3) the frequency, intensity, and severity of disturbances.

Temporal and Spatial Overlap

At least 716 (HDR Alaska, Inc. 2004) Steller's eiders and their winter foraging and resting habitat, occur within the action area of the proposed project. No designated critical habitat is located within the action area of the proposed project.

At least 36 (HDR Alaska, Inc. 2004) northern sea otters forage and loaf within the action area year round. Further, presence of adults with pups (HDR Alaska, Inc. 2006) suggests fidelity to this site by breeding otters. No designated critical habitat is located within the action area of the proposed project.

Within the action area, distribution of disturbances resulting from the proposed activities may be localized, as in the direct loss of foraging habitat, or may be diffuse resulting from disturbance by airport operations or the dispersal of oil within the marine environment.

Steller's eiders winter use of the area is assumed to include the time-period November through March. Therefore, Steller's eiders may not be present in the action area when construction of the proposed airport is anticipated to occur, but otters may. Once completed, the new airport will be operated while otters and Steller's eiders are present. The operation of the hovercraft to access the airport on Akun Island from Akutan will occur daily, weather permitting.

Nature and Duration of Effects

Potential direct and indirect effects of the proposed action considered in this Biological Opinion include: direct and permanent loss of habitat, displacement from foraging and resting habitat through disturbance, degradation of foraging habitat and reduced survivorship due to exposure to petroleum compounds, and injury or mortality resulting from collisions with vessels or infrastructure associated with the airport.

Based on the criteria used to define both Steller's eider winter habitat and northern sea otter year-round habitat, the construction of the airport will result in a direct and permanent loss of approximately 1.2 acres of near-shore marine habitat. The approximate 0.7 acres of near-shore habitat lost at Surf Bay is relatively pristine foraging and resting habitat compared to the busy and polluted Akutan Harbor, and is considered of higher value.

Evidence suggests that Steller's eiders exhibit high wintering site fidelity (Philip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm.; Paul Flint, US Geological Survey, Alaska Science Center, pers. comm.) and northern sea otters establish foraging and resting territories (Kenyon, 1981). Eiders and otters displaced from foraging habitat by direct loss or disturbance may not be able to relocate to alternative foraging areas of sufficient quality if these areas are limited in availability. However, survey data from 1992, when sea otter numbers were much higher, suggest that habitat for sea otters is not limited around Akun Island (Doug Burn, US Fish and Wildlife Service, Marine Mammals Management, pers. comm.).

During two consecutive construction seasons, there will be a large amount of activity in the action area. Crews will be operating vessels, operating land-based construction equipment, and will be working on the beaches where the proposed landing platforms will be constructed. Bedrock cuts will likely require blasting. Combined, these activities will cause a significant increase in noise in the vicinity of sea otters. Noise disturbance has the potential to frighten sea otters from the area, or make them wary and less attentive to natural predators, such as killer whales.

No injury threshold is available for sea otters related to underwater noise levels, but the National Marine Fisheries Service uses 190 decibels (dBs) as a threshold injury level for Steller's sea lion (HDR Alaska, Inc. 2006). Because sea otters spend about 80% of their time at the sea surface, we believe they are more susceptible to airborne disturbances than other marine mammals. Noise from construction is expected to be audible at 3,901 meters (2.4 miles) from the source, but is not expected to be acute or very loud at any one moment (HDR Alaska, Inc. 2006). Noise levels from the construction equipment for this project will be in the 97 dB range.

Ambient or normal baseline airborne noise levels have not been monitored, but are expected to be low due to the remote setting. Since the area is open and dominated by open water there are few noise attenuating features and noise is expected to carry well (HDR Alaska, Inc. 2006).

An above water sound survey of the BHT-150 hovercraft shows that it emits 82 dBA at 0 meters and about 72 dBA at 91 meters (300 ft) away when approaching (HDR Alaska, Inc. 2006; DLI Engineering Corporation 2006). When departing, the hovercraft noise is around 95 dBA at 0 ft and approximately 75 dBA at 182 meters (600 ft). Table 9 provides examples of human sound - decibel references. The decibel scale is a logarithmic response, which results in a doubling of sound intensity for each 10 decibel increase (Elsea 1996).

Noise from the hovercraft operation would be above 70 dBA for approximately 2-5 minutes while the hovercraft approaches or departs a landing area (HDR Alaska, Inc. 2006). The hovercraft will make one to two round trips daily, seven days a week. Sound levels will be above 70 dBA for approximately 10 minutes each day.

Table 9. Human reference for sound levels (FICN 1992 as in Pepper and others 2003)

Noise Source	Decibel Level	Human Effects
Jet take-off at 25 meters	150	Eardrum rupture
Aircraft carrier deck	140	
Military jet aircraft take-off from aircraft carrier with afterburner at 15 meters	130	
Thunderclap, chainsaw, oxygen tourch	120	32 times as loud as 70 dB; painfully loud
Steel mill, auto horn at 1 meter, riveting machine, live rock music	110	16 times as loud as 70 dB; average human pain threshold
Jet take-off at 305 meters, use of outboard motor, power lawn mower, motorcycle, jackhammer, Boeing 707 or DC-8 aircraft at 1nm before landing, Bell J-2A helicopter at 30 meters	100	8 times as loud as 70 dB; serious damage possible in 8 hour exposure
Beoing 737 or DC-9 aircraft at 1nm before landing, motorcycle at 7 meters	90	4 times as loud as 70 dB; likely damage in 8 hour exposure
Garbage disposal, dishwasher, average factory, freight train at 15 meters, propeller plane fly over at 305 meters, food blender	80	2 times as loud as 70 dB; possible damage
Passenger car at 104 kmh at 7 meters, vacuum cleaner	70	Arbitary base of comparison; upper 70s are annoyingly loud to some people
Conversation in restaurant, air consitioning unit at 30 meters	60	Half as loud as 70 dB; fairly quiet
Quite suburb, conversation at home	50	One-fourth as loud as 70 dB
Library, bird calls, lowest limit of urban ambient sound	40	One-eight as loud as 70 dB
Quiet rural area	30	One-sixteenth as loud as 70 dB; very quiet
Whisper, rustling leaves,	20	
Breathing	10	Barely audible

Noise and visual presence of the hovercraft would likely disturb Steller's eiders and northern sea otters in Akutan Harbor, along the proposed hovercraft route, and in Surf Bay. We site observations that were previously gathered within the Action Area as evidence to draw this conclusion. Previous observations of sea otters along Akutan Harbor's north shore indicate that feeding sea otters are easily disturbed by human presence along the shoreline (USACE 2004). Steller's eiders typically respond to an approaching vessel by swimming then flying from the area. Steller's eiders regularly flush in response to vessel traffic (Lanctot and King 2000a, HDR Alaska Inc. 2004). Flushing response to vessel traffic seems to increase through the winter, perhaps in response to repeated disturbance, increased hunting pressure in the spring, or natural restlessness by the birds prior to migration to their breeding grounds (HDR Alaska, Inc. 2004). Observations of eider responses to larger boats has not been observed, probably due to the fact that eiders tend to stay close to nearshore habitat and away from the center of the harbor where large boats travel (HDR Alaska Inc. 2004).

Each disturbance from the hovercraft would last for a short duration. The proposed hovercraft route avoids most of the nearshore waters in Akutan Harbor and avoids the kelp beds near Green Island and Surf Bay. However, the level of noise, the visual stimuli, and speed of onset of the noise could produce initial and residual responses that are harmful (Fair and Becker 2000, Frid and Dill 2002, Pepper and others 2003, Goudie and Jones 2004).

When disturbed by noise, animals may respond behaviorally (e.g., escape response) or physiologically (e.g., increased heart rate, hormonal response; Harms and others 1997, Tempel and Gutierrez 2003). Either response results in a diversion from one biological activity to another. That diversion may cause stress (Goudie and Jones 2004), and it redirects energy away from fitness-enhancing activities such as feeding and mating (Frid and Dill 2002). Other changes in activities as a result of anthropogenic noise can include: increased alterness, vigilance, agonistic behavoiur, escape behaviour, temporary or permanent abandonment of an area, weakened reflexes, and lowered learning responses (Welch and Welch 1970, van Polanen Petel and others 2006). Chronic stress, caused by noise, can lead to loss of immune function, decreased body weight, impared reproductive function, and abnormal thyroid function (Seyle 1979).

Goudie and Jones (2004) found that harlequin ducks exhibited intensified alert responses when noise levels exceeded 80 dBA. With the sudden onset of noise, the harlequin ducks startled and responded by flushing and panic diving. Further, agonistic behavior was observed in the harlequin ducks for up to 2 hours following the noise.

Response to noise disturbance is considered a nonlethal stimulis that is simalar to antipredator response (Frid and Dill 2002). Prey species may respond to threatening stimuli, such as loud noises and rapidly approaching objects, similar to their evolutionary response to predators. Although the corresponding flight response or increased vigilance response is non-lethal, a tradeoff between risk avoidance and energy conservation occurs. This tradeoff could lead to reduced survival and reproduction (Gill and Sutherland 2000, Frid and Dill 2002). Because a potential cause for the southwest DPS of northern sea otter decline may be increased predation from killer whales, it seems plausible that sea otters may be evolutionarily predisposed to illiciting strong anitpredator-type responses to perceived threats.

An animal’s response to anthropogenic noise is species specific. It depends in part on an animal’s hearing ability, which is often correlated with life history requirements (such as predator avoidance and reproduction), and the acoustic background of its natural environment (Pepper and others 2003, Goudie and Jones 2004). Some animals have the ability to habituate to noise (Harms and others 1997), while others may become even more sensitive (Fleming and others 1996 as in Goudie and Jones 2004). Steller’s eiders and northern sea otters may habituate to the hovercraft operations, but intuitively it is clear that unavoidable disturbances will occur on a regular basis for short periods of time (10 minutes/one way route) each day.

Steller's eiders and northern sea otters could be struck by the hovercraft along the proposed route. The operational speed for the hovercraft is 40 knots. This is significantly faster than other large craft operating in the area, but within the range of speeds used by skiffs and other small craft. Unlike small craft, the hovercraft has a wide beam, approximately 14 meters, and evasive actions may be more difficult. Also unlike conventional craft, the hovercraft will not affect underwater habitat and the animals could evade the craft by simply diving below the surface. The suddenness of these disturbances that is primarily related to the speed of the traveling hovercraft may increase the likelihood of collision or disturbance related mortality relative to conventional craft (HDR Alaska, Inc, 2006). Because the hovercraft may travel, without lights (radar only; Kate Pearson, HDR Alaska, Inc., pers. comm.), during darkness, Steller's eiders may flush from the sound in the direction of the oncoming hovercraft, increasing the probability of collision.

The probability of accidental release of fuels into Akutan Harbor and Surf Bay from fueling operations associated with the new airport construction and operation is anticipated to increase (HDR Alaska, Inc. 2006). Accidental petroleum releases can adversely affect the Steller's eiders and otters through either contamination of feathers and fur, direct consumption of petroleum (e.g., during preening and grooming), contamination of food resources, or reduction in prey availability, and can result in reduced survivorship and subsequent population declines. However, degradation of habitat due to chronic exposure to petroleum compounds is difficult to quantify. There is a potential for direct oiling of sea otters if a spill occurred in the head of the Harbor and the potential for contamination of their food sources in the Harbor. A fuel spill in Akun Strait may be less of an impact because it would quickly be circulated out of the area (HDR Alaska, Inc. 2006).

Disturbance Frequency, Intensity and Severity

According to Day and Pritchard (2000), an average of 6.5 petroleum spills (average size 212.2 gallons) per year were reported for Akutan Harbor in the 1990s. Approximately 26 petroleum spills were reported in Akutan Harbor from 2000 to 2005; an average 5.2 spills/year. The majority of the spills were small, resulting from overfill of tanks and leaks in pipes (ADEC 2006). The added spill risk as a result of this proposed project is considered to be small and severity of chronic effects is difficult to measure.

Approximately 76 vessels conduct business with the Trident seafood processor in Akutan Harbor. The Trident plant is busy between November and March (HDR Alaska, Inc. 2006). The Akutan community is regularly visited by barges and is served by the Alaska State Ferry System. Currently the PenAir Grummen Goose services the village two times a day whenever the weather allows. There will be additional vessel traffic during airport construction and the hovercraft will make one or two round trips each day, 7 days per week, from Akutan Harbor to Surf Bay on Akun Island

The severity of disturbance must be related to its affect on a species recovery rate. Any disturbance event that affects the species' ability to recover through decreased survivorship or reproductive potential would be considered severe. Both Steller's eiders and northern sea otters show high site fidelity (Kenyon 1981, Philip Martin, US Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, pers. comm., Paul Flint, US Geological Survey, Alaska Science Center, pers. comm.). Such life history characteristics place both Steller's eiders and sea otters at increased risk of disturbance where their habitat and industrial developments overlap.

There is limited information on noise thresholds for eiders or otters. Severity of disturbance to eiders for example, is considered greater when it forces them from previously pristine habitat into less optimal habitat (e.g. Surf Bay to Akutan Harbor). In the case of sea otters, 1992 data (when otter numbers were much higher) suggests that Surf Bay was used by otters, but not disproportionately to neighboring bays. Therefore, sea otters moving to another, quieter bay along the Akun coastline (which is the more likely scenario according to Douglas Burn, US Fish and Wildlife Service, Marine Mammals Management, Anchorage), may be a less severe move (from the standpoint of forage quality and disturbance) than the scenario for Steller's eiders.

Analyses for Effects of the Action

This section analyses the direct and indirect effects of the proposed and all interrelated and interdependent actions identified in the Environmental Baseline section. This includes a discussion of any beneficial effects anticipated to occur as a result of the proposed action.

Interrelated and Interdependent Actions

Actions that are interrelated and interdependent with the proposed construction and operation of an airport for the City of Akutan include the development of a quarry site on Akun Island to establish roads to the facility. The location of the quarry has not yet been determined, but geological explorations at the site confirm that suitable material is available at the site, and inland from the shoreline. Depending on the location of this quarry, human activity on the island of Akun could be expanded as there would now be easy access to other parts of the property. Feral cattle that now roam on Akun may also need to be moved or eliminated (HDR Alaska, Inc. 2006).

Direct Effects

Based on the criteria used to define Steller's eider winter habitat and northern sea otter habitat, the construction of the airport will result in the direct and permanent loss of 1.2 acres of such habitat. The loss of 0.7 acres of Steller's eider and northern sea otter habitat in Surf Bay is considered more severe as this is presumed uncontaminated foraging habitat and in an area of little to no disturbance. However, **direct lethal take that is anticipated to occur from direct loss of habitat is estimated to be well below one listed individual and is therefore considered discountable**.

Indirect Effects

Collisions with Hovercraft - Because the hovercraft glides above the water on a cushion of air, it is unlikely to strike an otter. Anecdotal evidence suggests that eiders may become disoriented by the sound of the approaching hovercraft, especially at night, and strike the oncoming vessel. This supposition is difficult to predict and may be improbable simply due to the low density of listed Steller's eiders that occur in the action area. Therefore, **no direct lethal take is anticipated to occur due to the discountable probability of collisions.**

Chronic Exposure to Petroleum Compounds - Due to anticipated probability that only a slight increase in chronic exposure to petroleum compounds is anticipated to result from this project, **no lethal take is anticipated because the incremental increase in petroleum compound transfer is so low that the probability of hydrocarbon contamination is considered discountable**.

Displacement from Foraging and Resting Areas and Disturbance from Airport Construction and Operation of the Hovercraft - We predict that noise disturbance from airport construction and from the operation of the hovercraft will cause both Steller's eiders and northern sea otters harm. **Over the life of the project, we anticipate the non-lethal take of 20 listed Steller's eiders and 36 listed northern sea otters in the form of harm due to disturbance.**

Steller's eiders currently use Surf Bay during winter, presumably for foraging and resting. During some months, Steller's eiders prefer Surf Bay over other protected bays within the action area, indicating that this is valuable habitat. Noise disturbance in Surf Bay may cause Steller's eiders to forage less frequently there, perhaps being displaced to forage in Akutan Harbor where the forage quality is presumed to be less.

Northern sea otters can occur anywhere within the action area, but it is notable that they have been documented directly along the hovercraft route at the mouth of Akutan Harbor. These data suggest that the otters are selecting the same quiet water that the hovercraft prefers to operate in. Further, sea otters frequent Surf Bay, which is currently free of most human caused disturbance. As discussed previously, Surf Bay is considered good sea otter habitat. Noise disturbance in Surf Bay may cause sea otters to use this area less frequently.

Species' Responses to Proposed Action

Numbers of Individuals in the Action Area Affected
Steller's eiders - Based on the high estimate of 716 (HDR Alaska, Inc. 2004) Steller's eiders, we estimate that 7 birds of the listed population are present in the action area of the proposed project. To determine the number of Steller's eiders expected to occur in Surf Bay, we calculated an expected proportion of wintering Steller's eiders in Surf Bay using Larned's February 2000 observations of 647 Steller's eiders in Akutan Harbor and 75 Steller's eiders in Surf Bay. We conclude that 10% of the birds within the action area may be using Surf Bay during winter. Expanding this conclusion to the highest estimate of Steller's eiders in the action area (716 birds; HDR Alaska, Inc. 2004) we estimate that 71 Steller's eiders may be expected to use Surf Bay during winter months. Of those 71 birds, 1% (or 0.72 of a bird), rounded to 1 bird, is of the listed population and present in Surf Bay each winter. Assuming that 1 listed bird is harmed each winter season, over the life of the project, we expect that **20 listed Steller's eiders will be harmed.**

Northern sea otter - Up to 36 sea otters from the listed DPS have been observed within the action area in one day (HDR Alaska, Inc. 2004). **Over the life of the project, we believe all 36 sea otters will be harmed.** This estimate assumes no recruitment of new otters to the area for the life of the project, although in all likelihood, pups will be born and other otters will move into the area. Therefore, 36 sea otters is an underestimate of the number of sea otters harmed by disturbance.

Sensitivity to Change

Both northern sea otters' and Steller's eiders' behaviors change with changing environmental conditions. They have been observed foraging in close proximity to human structures, including docks, and habitation. We do not know if total abandonment of Surf Bay and other habitats within the action area will occur, but anticipate some level of disturbance due to construction and hovercraft activity associated with the proposed project.

Resilience

Little information exists regarding the resilience of either of these species to perturbations. The world population of Steller's eider has declined by 80% from 1,000,000 in the 1940's (Tugarinov 1941 as in Solovieva 1997), to 200,000 in 1994 (Solovieva 1997). Extensive banding efforts and aerial survey efforts over the past decade indicate that the trend for the world population continues to be negative (Flint and others 2000, Larned 2000b). Lack of resilience due to low fecundity, low recruitment, high breeding adult mortality, and other unknown causes may be contributing to their continued decline. The southwestern northern sea otter DPS once contained more than half of the world's sea otters, but has undergone an overall population decline of at least 55–67 percent since the mid-1980s. In some areas within southwest Alaska, the population has declined by over 90 percent during this time period (USFWS 2005). The cause for the precipitous decline, and therefore resiliency to perturbations, is unclear.

Recovery Rate

Steller's eider

The natural recovery rate of Steller's eiders is not known. Long-lived species with low annual fecundity have a relatively slow recovery rate compared to short-lived species with high annual fecundity. Given the Steller's eider's observed low fecundity (i.e., small clutch sizes, high variability in nesting attempts, and generally low nest success) (Quakenbush and others 1995, D. Solovieva pers. com.), the recovery rate for this species is believed to be quite slow.

Northern sea otter

The history of sea otters in southwest Alaska is one of commercial exploitation to near extinction (1742 to 1911), protection under the International Fur Seal Treaty (1911), and population recovery (post-1911). By the mid-to late-1980s, sea otters in southwest Alaska had grown in numbers and recolonized much of their former range (USFWS 2005). The recovery of sea otters following the cessation of commercial hunting demonstrated that the species has the potential for recovery once the cause of its decline has been removed. As the cause of the current decline is not known with certainty, the future recovery of the southwest Alaska DPS of the northern sea otter is likewise uncertain (USFWS 2005).

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. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

In addition to the impacts of the proposed airport and hovercraft service, the impacts of this project combined with other projects in the action area need to be considered. The only other proposed project in the action area is the construction of a new boat harbor at the head of Akutan Harbor.

According to the biological assessment for the Akutan Harbor project (USACE 2001), construction of the proposed mooring basin would likely stimulate additional harbor-related development including fueling stations, vessel repair shops, vessel storage, grocery and supply stores, and equipment storage areas. Additional seafood processing facilities may become established in the area, and the community of Akutan would likely expand utility and other services to the harbor. Although most development is anticipated to occur on upland areas, some developments may affect Steller's eiders and northern sea otters, particularly fueling stations, seafood processing facilities, expansion of community infrastructure, and any activities directly impacting intertidal habitats such as the proposed airport access road. Affects of these projects may include direct habitat loss, increased risk of acute and chronic exposure to environmental contaminants, increased risk of bird strikes, and habitat degradation. Additionally, activities that increase foot traffic access to nearshore environments may result in displacement of Steller's eiders and northern sea otters from foraging habitat. With the increased development, human activity would also increase on the island and may cause an increase in poaching or subsistence hunting of eiders and sea otters.

The impacts of the new harbor may be amplified by the development of the new Akutan Airport. The proposed airport would improve the consistency and frequency of transportation to and from Akutan for the shipment of goods, as well as the transport of people. With more regular arrival of product shipments, the market may become more stable and accommodate the development of new businesses in Akutan. The location of new business establishments and developments would occur in the Head of the Harbor, as described above, and in the city of Akutan.

More reliable transportation to and from Akutan may also result in an increase in the year-round population of Akutan. Seasonal residents may decide to permanently relocate to Akutan when transportation is easier to obtain to and from the island.

CONCLUSION
This biological opinion assesses the direct and indirect effects of the construction of a new airport on Akun Island upon Steller's eiders and northern sea otters. Based on this effects analysis and an analysis of the cumulative effects, the Service determines whether this proposed action is likely to jeopardize the continued existence of this species, or destroy or adversely modify designated critical habitat. A conclusion of "jeopardy" for an action means that the action could reasonably be expected to reduce appreciably the likelihood of both the survival and recovery of either the Steller's eider or the northern sea otter. A conclusion of "adverse modification" means that the action could reasonably be expected to appreciably diminish the value of critical habitat for both the survival and recovery of this species. These conclusions are based on a synthesis of information provided in previous sections of this document.

Steller's Eider
The world population of Steller's eider has declined by 90%; from 1,000,000 in the 1940's, (Tugarinov 1941 as in Solovieva 1997) to 200,000 in 1994, (Solovieva 1997) to about 104,000 in 2003 (Atlantic and Pacific populations combined). The Steller's eider Alaska-breeding population is thought to number about 500 on the ACP, and perhaps dozens on the Yukon-Kuskokwim Delta. But, the high degree of variability in aerial survey data makes detecting anything but the most dramatic trends in the breeding population difficult.

The Steller's eider is a relatively long-lived, period non-breeder with low and variable nest success, low duckling survival, poor overall productivity, and variable annual recruitment. Reproductive parameters estimated from birds breeding in the Barrow area appear insufficient to maintain the population at current levels.

The Pacific population of Steller's eiders likely numbers 50,000 to 60,000. Populations of Steller's eiders molting and wintering along the Alaska Peninsula have declined since the 1960's. At 54,191, the 2002 Pacific population estimate by Larned and others (2002) was the lowest recorded since aerial surveys were initiated in 1992. Long-term spring survey data suggests a 6.1% annual decline in migrating Steller's eiders, and banding data from 1975 -1981 and 1991-1997 indicates a reduction in Steller's eider survival over time. At this rate of decline, the Steller's eider Alaska breeding population is projected by a simple deterministic population model to reach functional extinction (125 birds) in 35 years (USFWS 2006).

Lethal take anticipated from other Federal actions which have recently undergone section 7 consultation is estimated to be 10 listed Steller's eiders per year. When modeled (USFWS 2006), this take results in functional extinction by year 30, approximately 5 years prior to that predicted by the annual decline rate alone. Take of Steller's eiders as a result of the construction and operation of a new airport on Akun Island to service the City of Akutan is estimated to be 20 listed Steller's eiders due to disturbance from the hovercraft over the life of the project. This take is assumed to be initially non-lethal, but due to reduced foraging efficiency and increased stress, will result in harm, perhaps ultimately lethal or at least reduced fecundity. The nature and the level of take are not anticipated to accelerate functional extinction over the baseline model.

Northern Sea Otter
The southwest Alaska DPS of northern sea otter was listed as threatened based on the observed declining population trend, rather than the absolute number of sea otters remaining. The definition of a threatened species is one that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Recent surveys conducted in 2003 and 2004 indicate that the population decline has not abated in several areas within southwest Alaska. If the decline continues at the observed rates, the population may become extirpated throughout portions of its range within the next decade (Estes and others 2005), at which point the DPS may be in danger of extinction (USFWS 2005).

Sea otters rebounded from 1,000–2,000 individuals remaining after the cessation of commercial hunting, and the remaining otters were distributed in 13 isolated colonies. The current distribution of sea otters is different in that they occur throughout their former range, but at extremely low densities in most areas. The Aleutian archipelago constitutes approximately 30 percent of the available habitat within the range of the southwest DPS. Otters are now absent, or nearly so at some of the smaller islands in the Aleutian archipelago to the point where it is possible that Allee effects (reduced productivity at low population densities) may occur (Estes and others 2005).

Take of northern sea otters as a result of the construction and operation of a new airport on Akun Island to service the City of Akutan is estimated to be 36 listed otters due to disturbance from airport construction and the operation of the hovercraft. This take is assumed to be non-lethal, but due to reduced foraging efficiency and increased stress, will result in harm. If all 36 otters were removed, the Aleutian population estimate would be reduced by 0.4% and the total estimate of individuals of the listed DPS would be reduced by 0.09%. The nature and the level of this take are not anticipated to substantially accelerate the decline in the observed population trend.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or 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 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 FAA so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The FAA has a continuing duty to regulate the activity covered by this incidental take statement. If the FAA (1) fails to assume and implement the terms and conditions or (2) fails to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(a)(2) may lapse. In order to monitor the impact of incidental take, the FAA or any applicant 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)].

AMOUNT OR EXTENT OF TAKE
Steller's Eider
We anticipate that incidental take of Steller's eiders will be difficult to document because the actual number of Steller's eiders belonging to the Alaska breeding population at this site is unknown and harm from disturbance is difficult to measure. That said, we assume that 7 Steller's eiders from the listed population occur within the action area.

Displacement from Foraging and Resting Areas and Disturbance from Airport Construction and Operation of the Hovercraft

We predict that noise disturbance from airport construction and from the operation of the hovercraft will cause both Steller's eiders and northern sea otters harm. **Over the life of the project, we anticipate the non-lethal take of 20 listed Steller's eiders.**

We are currently unable to distinguish between North American breeding Steller's eiders and Steller's eiders that breed elsewhere when the birds are present on their molting or wintering areas. Future research may enable us to distinguish between listed and non-listed populations. Absent such capabilities, we will consider the expected take levels associated with this Incidental Take Statement to have been exceeded if any of the following occur:

1. Greater than ten Steller's eiders belonging to the listed Alaska breeding population are harmed or killed as a result of hovercraft operations;
2. Greater than 1000 Steller's eiders (of the wintering population) are harmed or killed as a result of hovercraft operations;

Effect of Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the Steller's eider because the nature and the level of take are not anticipated to accelerate functional extinction over the baseline model.

AMOUNT OR EXTENT OF TAKE
Northern Sea Otter
The Service is not including incidental take authorization for marine mammals at this time because the incidental take of marine mammals has not been authorized under section 101(a)(5) of the Marine Mammal Protection Act and/or its 1994 Amendments. Following issuance of such regulations or authorizations, the Service may amend this biological opinion to include an incidental take statement for marine mammals, as appropriate.

REASONABLE AND PRUDENT MEASURES
The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Steller's eider:

1. The FAA and/or the project sponsor shall minimize impacts to Steller's eiders during operation of the hovercraft.
2. The FAA and/or the project sponsor shall monitor impacts of hovercraft operation on Steller's eiders.

TERMS AND CONDITIONS
In order to be exempt from the prohibitions of section 9 of the ESA, the project sponsor must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.
1. The following terms and conditions shall implement Reasonable and Prudent Measure No.1. "The project sponsor shall minimize impacts to Steller's eiders during the operation of the hovercraft"

1.1 The project sponsor shall assure that the Route Operational Manual developed for the hovercraft adhere to the following conditions, insofar as these conditions do not conflict with human safety considerations:

- 1.1.a. The hovercraft will operate at a speed that reduces the noise level to below 80dB within 500 meters radius of Trident Seafoods in Akutan Harbor and within 500 meters radius of Surf Bay.
- 1.1.b. The hovercraft operator will be trained to identify and avoid flocks of Steller's eiders.

2 The following terms and conditions shall implement Reasonable and Prudent Measure No.2. "The project sponsor shall monitor impacts of the hovercraft operation on Steller's eiders"

2.1 The project sponsor shall monitor the impacts of hovercraft disturbance on Steller's eiders by assessing the correlation between audible emissions from the hovercraft and disturbance behavior at Steller's eider concentration sites including Surf Bay and near Trident Seafoods in Akutan Harbor. The project sponsor shall obtain approval of their monitoring study design from the USFWS prior to its initiation.

2.2 Eiders that have been injured or killed by colliding with the hovercraft shall be immediately reported to the Anchorage Fish and Wildlife Field Office and handled according to the "Protocol for Handling Sick, Injured, and Dead Spectacled and Steller's Eiders" (Appendix I). Wearing rubber gloves to protect the handler from disease, dead Steller's eiders shall be salvaged and kept frozen in doubled plastic bags until they can be transferred to the USFWS. The project sponsor shall pay for the expenses incurred in shipping and rehabilitating birds injured due to operation of the hovercraft.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Northern Sea Otter

1. Because an incidental take permit can not be issued for the take of northern sea otter, mandatory terms and conditions also cannot be issued. Therefore, as a conservation recommendation, we advise that the project sponsor monitor the impacts of hovercraft disturbance on sea otters using aerial surveys using a Before-After-Control-Impact (BACI) study design. The study should be initiated well before the commencement of hovercraft operation. A power anaysis should determine the sampling intensity, both before and after the operation of the hovercraft, so that statistical significance is achieved. The project sponsor is requested to submit the study design to the U.S. Fish and Wildlife Service for review prior to initiation of the study.

Migratory Birds

The Service would also like to take this early opportunity to provide conservation recommendations applicable to other trust resources within the action area. Under the prohibitions of the Migratory Bird Treaty Act, it is unlawful to harm migratory birds.

1. More than 50,000 Tufted puffins (*Fratercula cirrhata*) are known to nest on North Island (or Green Island as per HDR Alaska, Inc.). Noise from the hovercraft may substantially disturb these breeding birds causing reproductive failure. The project sponsor should monitor the impacts of hovercraft disturbance on the Tufted puffin colony. The project sponsor is requested to submit a monitoring survey design to the U.S. Fish and Wildlife Service for approval prior to initiation of the survey.
2. Because invasive rats are known to occur in Akutan Harbor, but have not been documented on Akun Island, the project sponsor should take precautionary measures to assure rats do not get to Akun Island. Rats can decimate seabird colonies on islands and also cause problems for other wildlife and humans. More than 160,000 birds of 17 species have been observed in and around the 11 seabird colonies of Akun Island (Appendix II).

REINITIATION NOTICE

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; (4) any of the non-discretionary Terms and Conditions are not implemented in a timely manner and completed by the deadlines set forth; or (5) a new species not covered by this opinion is listed or critical habitat designated that may be affected by this action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take should cease pending reinitiation.

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Appendix I

Protocol for Handling Dead
Spectacled and Steller's Eiders
Addendum to USFWS R7 Section 10 Permits
Last Updated February 2007

Introduction

The Fish and Wildlife Service needs to document mortality of threatened species whenever possible. Fish and Wildlife Service programs that use this information include Endangered Species, Environmental Contaminants, and Project Planning (to aid in recovery plans and implementation) and Law Enforcement (for enforcing the Endangered Species Act and other wildlife-related laws), in addition to numerous related research programs. Every dead spectacled and Steller's eider can aid in its species recovery by providing evidence and samples. We have developed this general protocol to help you help us utilize every threatened eider found dead.

In the past, this protocol covered handling and transport of injured or sick eiders. Because of avian flu concerns, we cannot currently transport injured or ill eiders for rehabilitation, so we can no longer provide instructions or a protocol for handling them. To minimize your risk, we recommend that you do not contact or handle wild birds that appear to be ill or injured.

Due to concerns about contracting avian influenza from handling bird carcasses, please make sure that you have proper personal protective equipment (PPE) and training prior to retrieving a carcass. Collect carcasses under the assumption that an infectious disease or toxic substance is involved and other animals or humans may be at risk. U.S. Department of the Interior PPE guidelines are available at the following web site:
http://www.doi.gov/issues/appendixOHSguidanceforAvian%20Influenza12-18.pdf.
Briefly, you need to protect yourself from fluids and feces by using impermeable gloves, safety glasses, a mask if necessary, and by decontaminating yourself and equipment with a bleach solution.

Reporting

Report all dead spectacled and Steller's eiders as soon as possible. If there is no reason to suspect that the bird(s) died as the result of any illegal activity, you should attempt to contact the following people, in the order listed, until you reach someone.

1. Angela Matz, USFWS, Fairbanks: (907) 456-0442 work, (907) 457-6723 home, (907) 456-0203 msg
2. Karen Laing, USFWS, Anchorage: (907) 786-3459 work, (907) 344-9840 home
3. Ted Swem, USFWS, Fairbanks: (907) 456-0441 work, (907) 474-9324 home, (907) 456-0203 msg
4. Greg Balogh, Anchorage: (800) 272-4174 toll free, (907) 271-2778 work, (907) 345-9899 home
5. Robert Suydam (North Slope Borough Dept. of Wildlife Management), Barrow: (907) 852-0350

6. Fred Broerman, Yukon Delta NWR, Bethel: (907) 543-3151

If you encounter any dead spectacled or Steller's eiders which you suspect may have died as a result of an illegal act such as shooting, a Service, Office of Law Enforcement should be notified immediately. This notification should occur prior to the disturbance or removal of any dead birds or other evidence. You should be prepared to report any observations and/or knowledge you might have regarding the incident and you will be provided with additional instructions regarding proper custodial handling techniques, which will allow a Special Agent to follow-up with an investigation into the incident.

USFWS, Office of Law Enforcement:
Fairbanks: (877)-535-1795 toll-free, (907) 456-2335, (907)-496-3534 pager
Cell numbers: 388-2853, 347-7704, 388-2854
Nome: (907) 443-2479, (907) 443-2938 fax
Anchorage: (800) 858-7621 toll-free, (907) 271-2828, (907) 268-1158 pager
Regional Office, Anchorage: (907) 786-3311, (907) 786-3313 fax

Ensure that one of the individuals in the first list is also contacted in these instances.

Your report should include:

1. Species, age, sex, and number of birds; date, time and location (latitude and longitude and area name);
2. Suspected cause of death;
3. Circumstances under which found;
4. If known, the names of witnesses or suspects, and a description of any vehicles or boats involved (but, non-law enforcement individuals are not expected to conduct investigations or obtain information that is not readily available).

If a camera is available, photograph birds and other evidence such as shotgun shells or casings, and persons and vehicles involved. Note photo date, time, and location.

You should put all this information, plus any additional details you think important (such as location of nearest power line), in a short written narrative.

Transport

If the person you contact from one of the lists above asks you to ship dead eiders, please follow the instructions below, shipping to the address they give you.

Packaging

Place carcass in a large ziplock or other waterproof plastic bag. Tie or secure this bag. Attach a tag to this bag with the following information in pencil/waterproof ink:

- species
- date collected
- location (state, county, location name, and latitude/longitude if available)
- collector (name/address/phone)

- additional history or comments on back of tag

then wrap in a second waterproof bag. Tie or secure this bag. Thoroughly rinse the outside of the second bag with a 1% solution of household bleach [1.25 oz or about 8 teaspoons of bleach (5.25 % sodium hypochlorite) per gallon of water].

Dispose of your PPE correctly and wash your hands with soap and water or an alcohol-based ($\geq$ 60% alcohol) hand sanitizer.

Storage

Keep the carcass refrigerated if the bird will be shipped within 48 hours, but freeze birds if the carcass is already showing signs of decay (stinks) or if shipping delays of more than 3 days are foreseen. When in doubt, refrigerate until you receive guidance. In remote field camps, place carcass in a pit dug down to permafrost.

Shipping

Ship the carcass in a sturdy, hard-sided insulated container. Pack the carcass with frozen gel or blue ice paks; do not ship with wet ice or snow. Put additional insulation in the container (such as crumpled newspaper or packing peanuts) so that there is no airspace.

Ship using Alaska Airlines Goldstreak, FedEx, or other expedited service. Notify the receiver of flight arrival times or tracking numbers so that the package can be picked up.

Expenses

If needed, USFWS (Anchorage or Fairbanks Field Offices, or the Office of Law Enforcement) will pay for shipping.

APPENDIX II

Rat Prevention Protocol

Rats and house mice are invasive rodents that exist on many Alaskan islands and can cause severe problems for wildlife and people. The further spread of these pests needs to be stopped as much as possible. The island of Akun is presently free of introduced rodents. The island of Akutan, and most communities which support Akutan (Unalaska, Kodiak, Seattle, Adak, etc.) have rats, and some have house mice. Cargo, ships or planes could bring rodents to Akun and cause an infestation. Therefore appropriate steps need to be taken to keep rodents from being introduced to Akun. These should include:

1) Ongoing rodent control at Akutan, with emphasis on docks and storage areas where rodents are most likely to get into boats or supplies headed for, or shipped through Akun. Rodent control measures should also be undertaken at other ports staging to transport goods to Akun.

2) Defensive stations need to be installed and maintained at Akun, adjacent to dock, airport terminal, and storage areas for the elimination/detection of rodents.

3) Precautionary measures must be taken during all assessment/construction activities on Akun to avoid introduction of rodents. Rat prevention and inspection need to be done on barges/ships, etc. before they arrive. All personnel need to be aware of the threat and what to do if rodent sign is detected.

4) An awareness campaign of the invasive threat, including instructions describing what to do, and not to do, must be conducted in the community of Akutan, with construction workers, seafood processor employees, visitors, and airline employees traveling to and through Akun Island.

5) Operators of the boats which will commute between Akutan and Akun need to be trained in how to recognize rodents and steps they can take to avoid transporting them. Personnel of aircraft companies which service Akun also need to be trained.

6) Shipwrecks can cause rodent introductions. Rat spill response must occur hand in hand with oil spill response in the case of shipwrecks.

Financing for supplies and labor adequate to insure invasive rodent prevention needs to be secured and maintained throughout the life of the project.

Finally, all construction equipment should be washed free of any dirt or mud prior to being offloaded on Akun, which might introduce invasive weed seeds to Akun.