February 4, 2003

In reply, refer to:
AFWFO

Colonel Steven T. Perrenot, District Engineer
U.S. Army Corps of Engineers, Alaska District
P.O. Box 898
Anchorage, Alaska 99506-0898

Subject: Biological Opinion regarding The Effects of 3-D Seismic Surveys in the Nearshore Waters of Lower Cook Inlet, Alaska, on the Threatened Steller's Eider **(*Polysticta stelleri*)** (consultation number 2002-0188).

Dear Colonel,

Enclosed is the Fish and Wildlife Service's Biological Opinion based on our review of the proposed issuance of a U.S. Army Corps of Engineers (COE) Nationwide Permit 6, for Fairweather Geophysical/Veritas DGC (FG) to conduct on-shore and off-shore seismic surveys, and its effects on the Steller's eider (*Polysticta stelleri*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). This letter provides only a summary of the findings included in the Biological Opinion where a complete discussion of the effects analyses is provided.

This biological opinion is based on information provided in the COE Nationwide Permit Pre-Construction Notification (COE 2002), and the Biological Assessment for Steller's Eiders 3-D Seismic Surveys, Lower Cook Inlet, Alaska (MACTEC 2002), distribution and abundance survey data, and other information available in our files and from experts within and outside federal government agencies. The complete administrative record for this consultation is on file at the Anchorage Fish and Wildlife Field Office.

Following is a summary of the consultation history for this project:

1. On June 27, 2002, the Service received the Notification for a Nationwide Permit Pre-Construction from the COE, with regard to the Cook Inlet Seismic Survey. The applicant was Fairweather Geophyisical/Veritas DGC.

2. On September 4, 2002, Ellen Lance met with Rick Trupp, FG, and discussed the Services concerns with regard to the seismic surveys, and possible avoidance measures.

3. Ellen Lance, in a telephone conversation with Ryan Winn, COE, on September 13, 2002, discussed the outcome of the meeting with FG, and potential avoidance measures that could be taken to avoid risk to Steller's eiders.

4. On September 27, 2002, Ellen Lance, Ryan Winn, Rick Trupp, and Jeff Hastings, FG, met to share information on the seismic survey techniques, the section 7 consultation process, known abundance information on Steller's eiders in Lower Cook Inlet, and possible measures that could be taken to avoid risk to Steller's eiders as a result of the seismic surveys.

5. On October 4, 2002, Ellen Lance, Judy Jacobs (Service), Ryan Winn and Robin Leighty (COE), Rick Trupp and Jeff Hastings (FG), Brian Lance (National Marine Fisheries Service), Caryn Rea (Phillips Alaska, Inc), and Donna Robertson (MACTEC), met to discuss the section 7 consultation process, known abundance information on Steller's eiders in Lower Cook Inlet, and possible measures that could be taken to avoid risk to Steller's eiders as a result of the seismic surveys. At this meeting a request was made to initiate formal consultation.

6. The Draft Biological Analysis was received by the Service on October 25, 2002.

7. On October 28, 2002, Ellen Lance, Donna Robertson, Rick Trupp, Jeff Hastings and Ryan Winn met to discuss further information needs for the Biological Assessment.

8. The Final Biological Analysis was received by the Service on November 1, 2002, and Formal Consultation was initiated.

9. On November 29, 2002, a Draft Biological Opinion regarding The Effects of 3-D Seismic Surveys in the Nearshore Waters of Lower Cook Inlet, Alaska, on the Treatened Steller's Eider (*Polysticta stelleri*) was submitted to the COE.

10. On December 5, 2002, Ellen Lance, Ryan Winn, Jeff Hastings, and Rick Trupp met to discuss the Draft Biological Opinion, specifically the Terms and Conditions.

The Service evaluated the direct and indirect effects of the proposed issuance of a Nationwide Permit 6, which will allow seismic surveys to occur in Lower Cook Inlet. Steller's eiders forage and rest in the nearshore waters off the eastern coastline of Lower Cook Inlet. It is expected that vessel activity related to the surveys will disturb feeding and resting Steller's eiders, and the noise of the underwater discharge of airgun arrays may interrupt their feeding or cause them to flush, thereby increasing their energy output and decreasing their forage intake. These two modes of disturbance are considered harm or harassment, and although not thought immediately lethal, may lead to reduced survivorship or fecundity.

After reviewing all available information on the location and timing of proposed action and the best available information on the status, distribution, and life history of the Steller's eider, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the species or cause adverse modification to designated critical habitat.

This Biological Opinion includes Reasonable and Prudent Measures and Terms and Conditions that the Service believes will minimize the impacts of incidental take of Steller’s eiders resulting from the proposed project. In order to be exempt from the prohibitions of section 9 of the ESA, the local project sponsors must comply with the Terms and Conditions, which implement the Reasonable and Prudent Measures.

If you have any questions concerning this Biological Opinion, please contact me at (907) 271-2778, or Endangered Species Biologist Ellen Lance at (907) 271-1467.

Sincerely,

Gregory Balogh
Branch Chief, Endangered Species Program

Enclosure

cc: Rick Trupp, Fairweather Geophysical/Veritas DGC
Ryan Winn, COE

BIOLOGICAL OPINION

The Effects of 3-D Seismic Surveys in the Nearshore Waters of Lower Cook Inlet, Alaska, on the Threatened Steller's Eider (*Polysticta stelleri*)

DESCRIPTION OF PROPOSED ACTION

The U.S. Army Corps of Engineers (COE) proposes to issue a Nationwide Permit 6 (a permit for survey activities) to Fairweather Geophysical/Veritas DGC (FG) to conduct two types of seismic studies in the waters of Cook Inlet. Seismic surveys are also proposed for onshore sites. Steller's eiders, a federally protected species under the Endangered Species Act, are known to winter in Cook Inlet. Recent data indicate they are particularly abundant along the shallow shoal from Homer Spit northward to Clam Gulch. This biological opinion analyses the potential effects of seismic surveys on wintering Steller's eiders in Lower Cook Inlet.

Onshore surveys will involve drilling 20-25 foot holes, which will be loaded with explosives. A total of 30 drill holes are expected. The survey lines extend from the beach fringe, inland, and an inline array of geophones will record geological data. This operation will take approximately 40-50 days, and surveys will commence in January of the year of operation. A Hughes 500D helicopter will be used to support this operation. *Explosives will not be detonated within, beneath, or adjacent to marine, estuarine, or fresh waters that support fish and wildlife during periods when fish or marine mammals are present, unless the detonation of the explosives produces an instantaneous pressure rise in the water body of no more than 2.5 psi or unless the water body, including its substrate is frozen* (COE 2002).

Offshore surveys will employ two types of techniques: 1) Streamer Scenarios, and 2) Ocean Bottom Cable (OBC). Streamer scenarios are used in relatively deep water (>100 feet) using multi-streamers: 1000-1800ci airgun arrays that are trailed from a vessel at 10 meters depth. Two arrays are towed 1700 meters apart by a shallow draft source vessel. A 24 Bit Das-1 recording system will be used for Streamer data acquisition (COE 2002).

OBC survey methods will be employed in nearshore waters, less than 100 feet deep. Two-small bow pickers will lay cable along the ocean floor, from shore to buoys deployed in the nearshore waters. Cables are deployed using hydraulically driven cable deployment equipment (MACTEC 2002). The airgun array is towed by a shallow draft vessel, which discharges compressed air every 50 meters over the cable, at a depth of 1-5 meters below the water's surface. The vessel travels along predetermined survey lines at a speed of 4 knots. The airgun is fired at regular intervals along the survey lines. The rapid discharge of compressed air through the airgun ports generate air bubbles, which collapse when the pressure inside the bubble is less than the water pressure outside the bubble. When this collapse occurs, a pulse is released into the surrounding water. The sound frequency range of the airgun array is 8 – 80 Hz (MACTEC 2002). A Sercel recording system is used for OBC data acquisition. Once the survey of a laid line (otherwise known as a "swath") is completed, the cables are picked up and laid again along another survey line.

Offshore surveys are proposed for four areas in Upper and Lower Cook Inlet (Figure 1). Surveys will be conducted within timing windows, based on winter conditions and State of Alaska timing restrictions. Because no Steller's eiders have been observed in or near the Forelands and Upper Cook Inlet polygons, this consultation will address concerns only for the East Cook Inlet and Anchor Point polygons.

Alaska Department of Fish and Game (ADF&G) regulations prohibit work within the East Cook Inlet polygon 15 April – 31 August. Therefore, surveys are expected to commence in March 2003, and end by 1 May 2002. They will resume again when fishing ends (mid to late August) and continue until approximately 15 November or until weather conditions force them to stop (MACTEC 2002). Project operations are expected to occur over a 1-year period of time.

OBC requires relatively quiet water to record, and therefore, the discharge of the arrays will occur only during slack tide, during daylight hours. In other words, potential disturbance from the noise of the arrays should only occur for 1-2 hours, two to three times/day.

Computer based navigation systems will be used onboard the vessels for primary positioning and daily plotting of known operation hazards (MACTEC 2002). Radio communication will be maintained among crewmembers on and between vessels. Oil spill kits will be available for on-board spills, and if "reportable quantities" of fuel were to be discharged into coastal waters, the appropriate regulatory agencies would be immediately notified (MACTEC 2002).

Steller's eiders are known to winter in the nearshore waters of Lower Cook Inlet. Concentrations of Steller's eiders in the low thousands have been reported from the nearshore waters north and south of Ninilchik during the winter months (Larned and Eldridge 1997; Larned 2001a, 2001b, 2002). A 6 December 2002 aerial survey the nearshore waters from Homer Spit to Clam Gulch reported 1332 Steller's eiders (Larned 2003). Steller's eiders rest and feed in these nearshore habitats. The impacts of airgun blasts on marine mammals and fishes have been well documented (Hill 1978, Turnpenny and Nedwell 1994, McCauley et al. 2000). Impacts to marine birds are less well understood, but because Steller's eiders dive for their prey, the Service believes adverse effects may result from the disturbance of seismic surveys in Lower Cook Inlet.

STATUS OF THE SPECIES

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, Service, 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 et al. 1995, Solovieva 1997), although we have records of aerial observations of Steller's eider pairs well inland on the Arctic Coastal Plain. 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 et al. 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 et al., 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 et al. 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 et al. 1995), and 15 percent (three of 20) hatched in 2000 (Philip Martin, Service, pers. comm.). In other years, Steller's eiders do not even attempt to breed near Barrow (Philip Martin, Service, pers. comm., Quakenbush et al. 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, Service, 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, Service, pers. comm.).

<u>Breeding Distribution</u>: 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, and western Alaska, primarily on the Y-K Delta. Currently, Steller's eiders breed on the western Arctic Coastal Plain in northern Alaska, from approximately Point Lay east to Prudhoe Bay, and in extremely low numbers on the Y-K Delta.

On the Arctic Coastal Plain, 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 Arctic Coastal Plain, however, so it is unknown if the species commonly nested there or not. Currently, the species predominantly breeds on the western Arctic Coastal Plain, 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.

<u>Post-Breeding Distribution and Fall Migration</u>: 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 Arctic Coastal Plain 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, Service, 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).

Molt Distribution: 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 et al. 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 et al. 1986; Dau 1987; Petersen et al. 1991).

Winter Distribution: 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 et al. 1994, Larned and Zwiefelhofer 1995).

Larned (2000b) did not see Steller's eiders along most of the Alaska Peninsula coastline he surveyed during winter of 2000. 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.

Spring Migration: In the spring, Steller's eiders form large flocks along the north side of the Alaska Peninsula and move east and north (Larned et al. 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, Service, pers. comm.). Interestingly, despite many daytime aerial surveys, Steller's eiders have never been observed during migratory flights (William Larned, Service, 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 et al. 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 et al. 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 et al. 1993, Larned 1998, Larned 2000b).

Summer Distribution in Southern Alaska: 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, Service, 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 et al. 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 et al. 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, U. S. Geological Service (USGS), Biological Resources Division, pers. comm.). Banding data from the Barrow area suggests some level of site fidelity for Steller's eiders breeding there as well (Quakenbush et al. 1995; Phillip Martin, Service, 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 et al. 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 et al. 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 et al. 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, USGS, 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 February (Philip Martin, Service, 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 et al. 2000). Robertson et al. (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 Yukon-Kuskokwim (Y-K) Delta and the Arctic Coastal Plain [about 804 kilometers (500 miles)], and (2) the anticipated site fidelity of nesting adult females (Anderson et al. 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 et al. 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 et al. 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 et al. 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 et al. 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 et al. (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, USGS, pers. comm.). In fall, winter, and spring predation can be attributed primarily to avian predators, such as bald eagles (*Haliaeetus leucocephalus*) and gyrfalcons (Christian Dau, Service, pers. comm.).

Population Dynamics

Population Size

<u>Yukon-Kuskokwim Delta</u>: Estimating the size of the Steller's eider breeding population in Alaska has proved difficult. The large sampling errors associated with systematic aerial surveys preclude generation of an accurate/precise statistical estimate. Aerial surveys that included the Y-K Delta but did not include the Arctic Coastal Plain indicate that the population sizes of eiders (*P. stelleri* and *Somateria* spp.) had declined by 90% since 1957 (Hodges et al. 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

(1991) 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 (Paul Flint, USGS, pers. comm.). In no single year have biologists found more than three nests there, despite extensive ground-based nest search efforts in good spectacled eider breeding habitat (Table 1).

Table 1. Recent sightings of Steller's eiders on the Y-K Delta (Paul Flint, USGS, pers. comm.)

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

NA-Not Applicable
Unk.-Unknown

<u>Arctic Coastal Plain/North Slope</u>: Two separate aerial breeding pair surveys have been conducted on the Arctic Coastal Plain of Alaska for a number of years at two different times during the Steller's eider nesting process. Those surveys are the Arctic Coastal Plain Breeding Pair Surveys (ACPBPS) and the North-Slope Eider Surveys (NSES). Mallek and King (2000) and Brackney and King (1996) reported on surveys designed for optimal population estimates for the greatest number of breeding waterfowl species on

the Arctic Coastal Plain (ACPBPS; Table 2). Larned and Balogh (1996) reported on annual aerial surveys designed to provide optimal population estimates for spectacled eiders (NSES; Table 3).

Table 2. Aerial population estimates for Steller's eiders, from aerial breeding pair surveys on the Arctic Coastal Plain (ACPBPS; Mallek and King 2000; Dau and Mallek 2000, 2001).

Year	Population Estimate
1989	2,002
1990	534
1991	1,118
1992	954
1993	1,313
1994	2,524
1995	931
1996	2,543
1997	1,295
1998	281
1999	1,250
2000	0
2001	433

Quakenbush et al. (1995) reported on ground surveys conducted specifically for Steller's eiders around Barrow from 1991-1994. Laing (1995) conducted helicopter based brood surveys around Barrow and south of Barrow. ABR (1999) conducted intensive aerial surveys within the "Barrow Triangle" area; surveys that, when compared to concurrent ground surveys, may be used to help derive an aerial survey visibility correction factor. However, Martin and Obritschkewitsch (2002) conducted such concurrent ground surveys during three different years (1999, 2000, and 2001), and concluded that there was not a strong correlation between aerial survey sightings and nest locations. That is, many of the Steller's eiders seen during the aerial breeding population surveys are transient birds.

Table 3. Aerial population estimates for Steller's eiders, from the North Slope (NSES; 1992-2000).

Year	Number Seen	Population Estimate	95% Confidence Interval	Researcher(s)
1992	0	0	NA	Larned and Balogh (1996)
1993	11	263	11-713	Larned and Balogh (1996)
1994	4	91	4-215	Larned and Balogh (1996)
1995	14	322	14-725	Larned and Balogh (1996)
1996	0	0	NA	Larned and Balogh (1996)
1997	8	189	8-432	Larned et al. (1999)
1998	0	NA	NA	Larned et al. (1999)
1999	31	NI	NI	William Larned, Service, pers. comm.
2000	0	NA	NA	William Larned, Service, pers. comm.

NA-Not Applicable
NI-Not Indicated

Despite attacking the problem of Steller's eider population estimation from many different angles, our collective efforts have shed little light on which method results in the best estimate and what the best population point estimate actually is. The problem of population estimation lies largely with the fact that the species is spread across a huge landscape at very low densities. In addition, we acknowledge that the number of Steller's eiders present on the Arctic Coastal Plain may fluctuate dramatically from year to year for reasons that are unclear. However, it is the opinion of the biologists most familiar with the species on its Arctic Coastal Plain nesting grounds that the breeding population there is best described as numbering in the hundreds, or perhaps in the very low thousands.

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 et al. 1995). Indeed, during some years, as in 2000 and 2002, Steller's eiders completely forego nesting in this area (Philip Martin, Service, 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 et al. 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 et al. 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 et al. 1997, Flint et al. 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 Arctic Coastal Plain.

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 Arctic Coastal Plain (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 et al. 2000, Larned 2000b). Indeed, long term survey data suggests a 7.6% annual decline in migrating Steller's eiders (R^2 = 0.86; Larned 2002). The imprecision of our breeding ground estimates precludes us from detecting any but the most obvious population trends for the listed entity. However, if a marine-based threat is causing a decline in the world population of Steller's eiders, then it seems reasonable to conclude that the Alaska breeding population may also be affected by such a threat.

New Threats

<u>Chronic Petroleum Spills</u>: 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 et al. 1978, Holmes et al. 1979, McEwan and Whitehead 1980, Leighton et al. 1983, Holmes 1984, Leighton 1993, Rocke et al. 1984, Yamato et al. 1996, Glegg et al. 1999, Trust et al. 2000, Esler et al. 2000) and their prey (e.g., amphipods and snails; Newey and Seed 1995 as in Glegg et al. 1999, Finley et al. 1999). Therefore, we believe that spilled petroleum is likely to adversely affect Steller's eiders.

Increased Risk of Lead Poisoning: Because this species 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. 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 et al. 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 et al. 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. 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 et al., 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 (Day 2001). 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.

Stochastic Events: The small population size of the Steller's eiders on the Y-K Delta and the Arctic Coastal Plain 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 et al. 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 et al. 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.

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 (LGL 2000; Lanctot and King 2000). 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. 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 et al. (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, Service, pers. comm.). Moreover, Flint et al. (2000) documented that female Steller's eiders, molting at Nelson Lagoon averaged 38% and 21% over 3 years. These data taken together suggests that spatial segregation among sexes, during winter, may lead to assumptions of skewed sex ratio depending on areas surveyed.

Table 4. Shifting sex ratio of Steller's eiders at sample area No. 1 in Izembek Lagoon (Dau et al. 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	6679	11%

Observations of the sex ratio skewed toward 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 et al.'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.

Analysis of the species likely to be affected

The Steller's eider was listed as a threatened species on June 11, 1997 (62 FR 31748). There is no critical habitat designated for Steller's eiders in Cook Inlet. Because of the risk of disturbance to wintering Steller's eiders in Lower Cook Inlet, seismic survey operations that occur while Steller's eiders are present, are likely to adversely affect

Steller's eiders. Adverse effects are likely to occur to Steller's eiders due to disturbance from the increased vessel activity within wintering habitat, and disruption of feeding and resting activity due to the noise generated by the subsurface vibrations from the rupture of compressed air bubbles. Steller's eiders, overall, are believed to be surviving at a marginal energetic threshold. Disturbance on their wintering grounds in Lower Cook Inlet may cause them to flush when feeding or resting, and may result in decreased survivorship or reproduction.

ENVIRONMENTAL BASELINE

When preparing a biological opinion, under 50 CFR 402.14, the Service is responsible for evaluating the "effects of the action" (i.e., direct and indirect effects together with effects of activities that are interrelated or interdependent) on federally listed species. These effects become additive to the environmental baseline.

The "environmental baseline" section of Service biological opinions summarize the effects of past and present human and natural phenomena on the current status of threatened and endangered species and their habitat in an action area. The "environmental baseline" section establishes the base condition for natural resources, human usage, and species usage in an action area, which would be used as a point of comparison for evaluating the effects of an action.

Assumptions Used in Analysis of Past, Present and Future Effects

Proportion of Wintering Birds from Listed Population

We are assuming that 4.2 percent of all Steller's eiders observed on the wintering grounds in Alaska are from the listed Alaska breeding population. This estimate derives from an average of the three most recent spring migration surveys for a total population estimate of 60,459 birds (Larned 2000b, 2001, 2002), and the highest point estimate of nesting Alaskan birds (2,543 birds; Table 2). Both are conservative estimates and, thus, are negatively biased to an unknown degree.

Determination of Action Area

The action area is defined as the on and offshore extent of the polygons specified in the project plan (Figure 1), with the offshore areas being those in which Steller's eiders could be affected. The area of the Anchor Point offshore polygon is approximately 7 square kilometers, and the area of the East Cook Inlet offshore polygon is approximately 33 square kilometers.

Status of the Species Within the Action Area

Information on the timing and distribution of Steller's eiders wintering in Lower Cook Inlet is lacking. Aerial shoreline surveys were conducted in Lower Cook Inlet in 1976 (Erikson 1997), and 1994 (Agler et al. 1994), but those surveys concentrated on Kachemak Bay and the western shoreline of the inlet. They did not survey the coastline from Anchor Point northward.

Erikson (1977) reported seeing eight Steller's eiders on 10 May around Kalgin Island, just south of the forelands of Cook Inlet. During an aerial survey on 17 February 1994, 22 Steller's eiders were observed within 400 meters of shore, between Anchor Point and Homer Spit (Agler et al. 1994). However, since 1997, surveys and opportunistic observations along the eastern shoreline of Lower Cook Inlet indicate a substantial concentration of Steller's eiders use the nearshore environment from Homer Spit to Clam Gulch (Table 5).

Although data are limited, the nearshore habitat north and south of the mouth of Deep Creek appears to be important wintering habitat for Steller's eiders. Steller's eiders have been repeatedly observed foraging and resting in flocks along the shallow shoal from Homer Spit to Ninilchik, which is often ice free when the western shore and Upper Cook Inlet are not.

Table 5. Summary of survey and opportunistic observation data collected on the eastern shore of Lower Cook Inlet, 1997 through 2003.

Number of Steller's eiders	Date of Observation	Location	Citation
650	16 January 1997	Immediately South of Ninilchik	Larned and Eldridge 1997
87	16 January 1997	Between Anchor Pt. And Homer Spit	Larned and Eldridge 1997
1100	14 March 2000	Within 13 km South and 18 km North of Deep Creek	Larned and Bowman 2000
800	2 March 2001	400-600 meters Offshore, 5 km South of Deep Creek	Larned 2001b
1500	2 March 2001	2 km Offshore, 15 km North of Mouth of Deep Creek	Larned 2001b
70	2 March 2001	17 km North of Mouth of Deep Creek	Larned 2001b
252	2 February 2002	Within 13 km South and 18 km North of Deep Creek	Larned 2002
1332	6 December 2002	Within 13 km South and 18 km North of Deep Creek	Larned 2003

Factors affecting species' environment within the action area

Human Disturbance

Vessel traffic in the vicinity of Steller's eider wintering habitat in Lower Cook Inlet has been low, to the point of being virtually discountable during winter months. Commercial fishing operations are minimal to non-existent in the Ninilchik/Deep Creek areas from

November through April (Pat Shields, ADF&G, pers. comm.). Furthermore, popular sport fishing areas near Ninilchik and Deep Creek, which attract 10 or more, < 28-foot vessels each day, are active May through October (Niki Szarzi, ADF&G, pers. comm.). During winter, large oil tankers transit Lower Cook Inlet, however they travel far from shore in the main channel.

Petroleum Spills

Fifteen oil production platforms are currently in Cook Inlet, located between the Forelands and the North Forelands. Submerged gas and oil pipelines and electric power cables cross the inlet. Major ports are located at Anchorage, Kenai, Nikiski, and Homer, major tanker docking and petroleum storage facilities exist at Drift River, Trading Bay and Nikiski, and several smaller facilities are located along the shorelines (Whitney 2002).

Between 1884 and 2001, 28 oil spills requiring National Oceanic and Atmospheric Association (NOAA) intervention have occurred in Cook Inlet (Whitney 2002). Most spills involved volumes of tens of barrels or less. Platforms spills occurred most frequently and involved crude oil. Because of the high level of turbulence in Cook Inlet, crude oil particles disperse quickly (Whitney 2002).

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 to 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

Proximity to the action

Steller’s eiders numbering in the thousands have been observed within the Eastern Lower Cook Inlet seismic survey polygon (Figure 2). Fewer than 100 Steller’s eiders have been observed within or nearby the Anchor Point polygon. Both the Eastern Lower Cook Inlet and Anchor Point polygons contain eider foraging and resting habitat.

Distribution

The location of the proposed seismic surveys is within the wintering habitat of Steller's eiders.

Timing

Steller's eiders have been reported at Homer Spit as early as 4 November, but more regularly mid-November, and remain there until the end of April (Dr. George West, pers. comm.). Seismic survey activity is scheduled to begin between 1 and 15 March, and will end between 1 and 15 May, due to ADF&G regulations. In fall, seismic surveys commence as soon as fishing ends (approximately mid-August) and continue through 15 November or until weather becomes prohibitive (MACTEC 2002)

Nature of the effect

Direct and indirect effects anticipated due to seismic surveys in Cook Inlet include: 1) disturbance of Steller's eider foraging and resting areas; 2) increased risk of oil spills, and 3) increased probability of bird strikes.

Disturbance from two sources is expected as a result of this project: 1) vessel disturbance; and 2) underwater noise as a result of the airgun blasts. Vessel traffic may disturb Steller's eiders while feeding or resting, which may have an adverse affect due to the energetic output of escape and stress. Disturbance of feeding and resting Steller's eiders has been documented, and may have varying degrees of severity based on season and frequency of disturbance (Lanctot and King 2000). Disturbance from the airgun blast may result when Steller's eiders are diving for food. The sound of the collapsing air bubbles may travel through the water and disturb feeding activity or flush birds from their resting sites. It is unknown whether such shockwaves will result in temporary or permanent auditory shifts.

Airgun blasts produce bubble pulses similar to those from explosions. They create shock waves that are lethal to fishes of certain size classes when exposed at close range (Hill 1978). In shallow waters a bottom-reflected shock wave increases the impulse of that blast (Hill 1978). Refraction of the shock waves are damaging, however, over short distances (a few hundred meters at most; Hill 1978). Although underwater shock waves are created naturally by earthquakes, the frequency with which seismic surveys create those waves does not replicate natural processes.

Duration

The duration of disturbance may be up to 16 weeks, 8 weeks during spring and 8 weeks during fall.

Disturbance frequency

Disturbance from the airgun array will occur during two to three 1-hour periods/day. Disturbance from vessels might occur more frequently, because at least three vessels will be setting up transects and laying cable between slack tides.

Disturbance intensity

Disturbance from blast noise will be high during the ignition of the airgun arrays, and disturbance from boats will be high while the bottom lines are laid for the surveys.

Disturbance severity

Steller's eiders show high fidelity for specific molting sites within lagoons (Flint et al. 2000). Additionally, high levels of wintering site fidelity have been found for other species of sea ducks (Robertson et al. 1999, 2000, Cooke et al. 2000), and evidence suggests that Steller's eiders similarly exhibit high wintering site fidelity (Philip Martin, Service, pers. comm., Paul Flint, USGS, pers. comm.). Indeed, the repeated sightings of Steller's eiders off the Deep Creek coastline, suggest this is a favored site in winter.

Ice conditions may displace Steller's eiders from preferred locations. These preferred locations are important foraging areas and may be a limited resource (Laubhan and Metzner 1999). Indeed, over-winter starvation resulting from displacement from feeding areas is thought to be a contributing factor to mass mortality of common eiders in the Wadden Sea (Camphuysen 2000). Alternative foraging areas of sufficient quality may not be available for some wintering eiders. Thus, eiders displaced by noise disturbance may not be able to simply relocate without being harmed.

Human-induced disturbance can have significant energetic consequences on waterfowl (Belanger and Bedard 1990). Responses to anthropogenic noise may be to stop feeding or to fly away. In snow geese, the time needed to resume feeding after noise disturbance was five times greater at a daily disturbance rate of 2.5 disturbances/hour than at 0.5 disturbances/hour (Belanger and Bedard 1990). Additionally, when the rate of disturbance was 0.5 disturbances/hour, feeding time decreased by 8.5% (Davis and Wiseley 1974).

Responses to noise can vary between species and between individuals of a single population (Radle 2002). Variable responses may be due to the variable characteristics of the noise and its duration, the life history characteristics of the species, season, sex and age of the individual, level of previous exposure, and if other physical stresses are affecting the individual at the time of exposure (Busnel 1978).

Analyses for effects of the action

The following summary of the description of the "action" under consultation is provided so that the subsequent analysis of effects and the scope of the biological opinion are clear. The proposed action is the summary of action.

Beneficial effects

Beneficial effects are those effects of an action that are wholly positive, without any adverse effects, on a listed species or designated critical habitat. There is no aspect of this project that is beneficial to Steller's eiders. The project applicants have stated that "to the extent possible" OBC operations may be scheduled to occur outside the areas of known Steller's eider concentrations during November, March, and early April (MACTEC 2002). Furthermore, to avoid the risks of bird collisions with lighted vessels, sodium lights will be shielded downward. While these actions will minimize adverse affects, there are no known wholly beneficial effects of this action to listed species.

Direct effects

<u>Habitat:</u> The seismic surveys will not result in a permanent loss of any near-shore habitat that is used by wintering Steller's eiders. Foraging habitat may be disturbed through the deployment and retrieval of the bottom-cable, however, this disturbance will likely not result in permanent loss. No critical habitat for Steller's eiders occurs within the action area of the project.

<u>Eiders:</u> We believe that this project may directly affect Steller's eiders through disturbance, which may result in reduced time foraging and increased energy expenditures from flying away from the disturbance, stress from the disturbance, and added time foraging. This disturbance will occur either from the vessels operating within Steller's eiders foraging and resting habitat, or from the noise associated with the ignition of the airgun arrays.

Lanctot and King (2000) observed that Steller's eiders within Akutan Harbor were exposed to a large number of vessels, including large and small fishing vessels, small skiffs, and barges, on a daily basis. Steller's eiders showed variable responses to vessels approaching. When approached to within 100 meters, Steller's eiders sometimes responded by swimming then flying from the area. Other times Steller's eiders flushed at a distance of 200-300 meters from the vessel. Variability in tolerance to approaching vessels may be a function of seasonal sensitivity, habituation to human activity, or a combination thereof (Lanctot and King 2000).

Disturbance is expected to occur from vessel activity during a time period when typically there is usually none, and from underwater explosions from airgun arrays. These disturbances are equally likely to affect all Steller's eiders within some unknown distance to the disturbance source. The effects are not expected to be lethal, but it is unknown to what extent this disturbance might affect hearing, fecundity or survivorship.

On 2 March 2001, a maximum count of 1570 Steller's eiders was made from within the East Cook Inlet polygon (Figure 2; Larned 2001a), and on 2 February 2002, approximately 10 were observed on the edge of the Anchor Point polygon (Larned 2002). Assuming that 4.2% of wintering Steller's eiders breed in Alaska, we estimate that 66 Steller's eiders of the listed entity are at risk of disturbance from vessel activity or noise from airgun arrays.

The potential for disturbance can be minimized, by avoiding the areas in which Steller's eiders are foraging and resting. Because the seismic survey operations have the flexibility to modify their operation plans and navigate away from flocks of eiders, and because airguns can be silenced if eider flocks are observed, there is a unique opportunity to completely avoid the potential for take in the form of disturbance.

The risk of harm to Steller's eiders can be significantly reduced if the following measures are taken: 1) aerial monitoring of seismic survey polygons for Steller's eiders; and 2) avoidance of the flocks or individual birds (as outlined in Term and Condition 1.1 below). Once Steller's eiders have arrived in the vicinity of the seismic survey polygons, daily flights would identify the locations, which Steller's eiders are feeding and resting. Avoidance of the flocks or individual birds by at least 300 meters would effectively eliminate the risk of disturbance by vessels (Lanctot and King 2000) and disturbance from airgun blasts (Hill 1978). Indeed, we believe these avoidance measures would reduce the risk to eiders to the point of disturbance being discountable.

Interrelated and interdependent actions:

Interrelated and interdependent actions are those actions that would not stand alone (interdependent) or would not occur, but for the proposed action (interrelated). No interrelated or interdependent actions have been identified for this project.

Indirect Effects:

Indirect effects of the proposed seismic surveys in Cook Inlet include the potential for the release of contaminants from the support vessels and for bird strikes on the lighted vessels.

<u>Exposure to Hydrocarbons</u>: Exposure to petrogenic hydrocarbons from boating or fishing activities and accidental oil spills have killed or otherwise adversely affected Steller's eiders (Fox et al. 1997), and is cause for concern in the wintering areas of Steller's eiders in Alaska. Steller's eiders using waters also used by vessels will be susceptible to adverse effects resulting from petroleum products spilled and released in contaminated bilge water. They may also ingest mollusks and marine crustaceans that have been contaminated with petroleum (Rand and Petrocelli 1985). In addition, eiders may suffer from reduced foraging opportunities if petroleum contamination reduces prey availability.

Petroleum may adversely affect Steller's eiders through: (1) fouling feathers, thus compromising thermoregulation; (2) causing direct toxicity through consumption of petroleum (e.g., during preening); (3) contaminating food resources; and (4) reducing prey availability due to the toxic effects of petroleum on prey species. It is known that petrolium products released into the marine environment cause adverse effects on eiders (Stout 1998), other marine birds (Yamato et al. 1996; Trust et al. 2000; Esler et al. 2000; Custer et al. 2000) and their prey (Glegg et al. 1999), and that those effects can remain for years (Hayes and Michel 1999). Furthermore, the gregarious behavior of Steller's eiders may result in acute or chronic poisoning of large numbers of birds from just one spill.

Acute exposure due to direct contact with surface oil may result death, sickness or impaired physiological function. Chronic exposure to petroleum compounds through contaminated food sources may have sub-lethal effects on reproductive success, immune system function, and overall condition.

While the contracted support vessels have spill kits sufficient to handle on-board spills, accidental discharge of petroleum products and other contaminants into the aquatic environment may occur during the seismic surveys. However, the probability of a spill of such magnitude that would injure Steller's eiders or their habitat is small.

Collisions with Lighted Vessels: Anecdotal evidence that eiders and other sea ducks may become disoriented and strike vessels and other lighted structures in adverse weather conditions supports the assumption that Steller's eiders staging, molting and wintering in close proximity to fishing vessels are at increased risk of similar collisions. Because the project applicants have agreed to shield and direct the on-board sodium lights downward, the risk to eiders striking the support vessel is reduced.

Species' response to a proposed action

Numbers of individuals/populations in the action area affected:

Aerial survey data and opportunistic observations indicate that up to 1570 Steller's eiders use waters within the action area of this proposed project.

Sensitivity to change:

Steller's eiders behavior appears to change with changing environmental conditions. At times, they have been observed foraging in close proximity to human made structures. They have also been observed foraging and resting adjacent to docks. However, we have observed that they move and maintain a distance of at least 100 meters from humans and vessels. As such, we do not anticipate total abandonment of areas due to the increased vessel activity and subsurface, underwater noise that is associated with the proposed project, but anticipate some level of disturbance due to the seismic surveys.

Resilience:

We have little information suggesting what sort of resilience to perturbations is inherent in this species. We do note, however, that the world population has declined by 80% since the 1940s, from 1,000,000 (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 et al. 2000, Larned 2000b). As such, the Steller's eider does not appear to be resilient enough to overcome the current mortality factors causing its decline.

Whether this lack of resilience is due to low fecundity, low recruitment, or excessive adult mortality is unknown. Because the mechanism causing the decline and failed recovery of Steller's eiders over that past 70 years is unknown, a conservative approach is necessary to assure that Federal actions do not further imperil this species.

Recovery rate:

The natural recovery rate of Steller's eiders is not known. Recovery rate is a relative response and is tied, in large part, to traits of the species' life history. In general, 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 et al. 1995, D. Solovieva, Zoological Institute, Russian Academy of Science, pers. comm.), the recovery rate for this species may be quite slow. Disturbance may cause further reduced fecundity, due to stress or reduction in body condition, and may prevent the recovery of this species.

CUMULATIVE EFFECTS

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

Although there is limited fishing activity (commercial or sport) during the period when Steller's eiders occupy winter habitat in Lower Cook Inlet, disoriented Steller's eiders may collide with fishing vessels operating with bright lights near-shore, particularly when weather conditions are poor. Furthermore, petroleum releases from vessels and oil platforms associated with oil development may increase the risk of acute and chronic effects of oil on Steller's eiders and their prey.

Conclusion

After reviewing the current status of the Alaskan breeding population of Steller's eiders, the environmental baseline for the action area, the cumulative effects, and the effects of the proposed action, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the species, nor is it likely to adversely modify or destroy Steller's eider critical habitat.

The regulations (51 FR 19958) that implement section 7(a)(2) of the Act define "jeopardize the continued existence of" as, "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." We have concluded that the proposed action is not likely to jeopardize the continued existence of the Alaska breeding population of Steller's eiders or adversely modify or destroy its critical habitat. However, we do recognize that adverse impacts may occur to Steller's eiders on their winter forage and resting areas, due to the disturbance from vessel activity and subsurface noise generated by ignition of airgun arrays.

Steller’s eiders in Lower Cook Inlet represent no more than 2.0% of the federally protected, Alaska breeding population of Steller’s eiders. The following justifications led us to the conclusion that this action, as proposed, is not likely to jeopardize the continued existence of this species: 1) effects are not expected to be directly lethal; 2) effective avoidance measures can be taken to reduce the risk of take; 3) other measures have been incorporated into the project design (downward shielding of sodium lights) to reduce risk of take.

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 COE 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 COE has a continuing duty to regulate the activity covered by this incidental take statement. If the COE (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(o)(2) may lapse. In order to monitor the impact of incidental take, the COE 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 anticipated:

We anticipate that incidental take of Steller's eiders will be difficult to document because: 1) the effects of vessel disturbance on Steller's eiders within the action area will be difficult to quantify; 2) the effects of underwater blasts from the airgun arrays on Steller's eiders will be difficult to quantify; 3) effects to Steller's eiders, exposed to varying levels of disturbance and contamination on their winter forage and resting grounds, may not be immediately lethal, but may ultimately result in their death or reduced fecundity; and 4) the number of Steller's eiders belonging to the Alaska breeding population at this site is unknown.

Take Related to Disturbance from Vessel Traffic and Noise Originating from the Ignitions of the Airgun Array

The Service anticipates that disturbance to Steller's eiders will occur in association with the legal operation of vessels operating during the seismic surveys. This disturbance may result in the interruption of foraging or flying from a foraging or resting area. Additionally, the subsurface noise generated from the ignition of the airgun arrays is expected to likewise reduce caloric intake, and increase energy output by flushing or stressing the birds. **We estimate that no more than 66 Steller's eiders of the listed Alaska breeding population will be taken as a of the Nationwide Permit 6 issuance for FG to conduct seismic surveys in Cook Inlet.** This take is expected to be in the form of harm or harassment.

Take Related to Acute and Chronic Exposure to Petroleum Compounds

The Service does not anticipate that petroleum releases will occur in association with the seismic survey operations, however we realize there is some risk that comes with vessels operating intensively in a nearshore environment. We believe that, although possible, the risk to Steller's eiders from the vessels operating in these seismic surveys is unlikely.

Take Related to Collisions with Vessels

Because FG has taken the added precaution of assuring that the sodium lights on the source vessel are shielded and oriented downward, the Service does not anticipate any bird strikes in association with the seismic survey operations.

In total, the Service expects that the seismic survey in Lower Cook Inlet, Alaska will result in the take, in the form of harm, of 66 Steller's eiders of the Alaska breeding populations. The Service does not expect this take to be directly lethal to the birds, however, reduced energy input (forage), increased energy output (flushing), and stress may result in decreased survivorship or fecundity.

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 assume the expected take levels associated with this Incidental Take Statement to have been exceeded if any of the following occur:

1) Greater than 1570 Steller's eiders are harmed or harassed as a result of vessel or noise disturbance in association with the seismic surveys;
2) Greater than 66 (=1570*0.042) Steller's eiders of the listed entity are harmed or harassed as a result of vessel or noise disturbance in association with the seismic surveys;

<u>Effect of the take</u>:

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

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 COE shall require FG to minimize the potential for impacts to Steller's eiders during seismic surveys.
2) As an alternative to Reasonable and Prudent Measure 1, the COE shall require the permittee to monitor and document the impacts of seismic survey operations on Steller's eiders.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the COE 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.

The following term and condition implements Reasonable and Prudent Measure No. 1: “The COE shall require FG to minimize the potential for impacts to Steller’s eiders during seismic surveys.”

1.1 If seismic surveys occur within the previously agreed upon timing window for Steller’s eider wintering in Lower Cook Inlet (15 November through 15 April), then the COE shall require FG to conduct regular aerial monitoring to determine the presence of Steller’s eiders within their area of operations (Anchor Point and East Cook Inlet polygons only).

- 1.1.1. Aerial monitoring shall be flown biweekly, until the first Steller’s eider observation is reported (by any party) along the eastern shore of Lower Cook Inlet. After it is known that Steller’s eiders are within the vicinity, then aerial monitoring shall occur one time per day of operation, within the Anchor Point or East Cook Inlet polygons.
- 1.1.2. Monitoring surveys shall be conducted by a qualified Service biologist or a similarly qualified contract biologist, experienced with identifying Steller’s eiders from the air, using a monitoring protocol approved by the Service. If Service biologists are unavailable for the surveys, a qualified contract biologist with experience conducting aerial waterfowl surveys must be present on the survey flights.
- 1.1.3. If Steller’s eiders are observed, their numbers shall be estimated, locations shall be recorded using GPS coordinates, and data reported to Greg Balogh, Endangered Species Branch Chief, at the Anchorage Fish and Wildlife Field Office within 2 days (phone: 907 271-2778, fax: 907 271-2786, email: greg_balogh@fws.gov).

1.2. If Steller’s eiders are observed during the aerial monitoring surveys, the COE shall require the permittee to avoid flocks. A distance of 300 meters (Hill 1978, Lanctot and King 2000) must be maintained from all flocks of Steller’s eiders.

1.3. COE shall require FG to maintain a daily monitoring log at the helicopter base, recording effort and results of Steller's eider monitoring. This log will be available for review by the COE or Service at any time.

1.4. COE shall require FG to supply vessel operators with draft Geographic Response Strategies (GRS) for the areas in Lower Cook Inlet in which they will be conducting seismic surveys. Additionally, the vessel operators shall be provided a list of contacts in case of spills, provided in the Subarea Management Plan for Cook Inlet. Draft GRS's and contact lists for Lower Cook Inlet are available on the Alaska Department of Environmental Conservation website and draft GRS's for Deep Creek, Ninilchik, and Clam Gulch have been provided in this document (Appendix I).

The following terms and conditions implement Reasonable and Prudent Measure No. 2: "As an alternative to Reasonable and Prudent Measure 1, the COE shall require the permittee to monitor the potential impacts of seismic survey operations on Steller's eiders."

2.1 If seismic surveys occur within the timing window for Steller's eider wintering in Lower Cook Inlet (15 November through 15 April), then the COE shall require FG to have a qualified, experienced biologist remain aboard the source vessel and monitor behavior of and record evidence of disturbance to eiders.

2.1.1 The biologist monitoring disturbance to Steller's eiders must be qualified, experienced, and approved by the Service. Protocols to monitor behavior and assess disturbance must be developed and approved by the Service prior to commencing the seismic surveys. Monitoring must occur during ignition of the airgun arrays as well as outside of that time for comparison.

2.1.2 A report of the analysis and interpretation of the monitoring data, as well as the raw data, must be provided to the Service within 6 months after the seismic surveys are completed.

2.2 COE shall require FG to maintain a daily monitoring log on the source vessel, recording effort and results of Steller's eider monitoring. This log will be available for review by the COE or Service at any time.

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. No conservation recommendations have been developed for this proposed action.

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 at least one of the following factors occurs: (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) a new species not covered by this opinion is listed or critical habitat designated that may be affected by this action; or (5) if lethal take occurs to one or more Steller's eiders, as a direct result of the seismic survey operations. 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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