United States Department of the Interior

FISH AND WILDLIFE SERVICE
Anchorage Fish & Wildlife Field Office
605 West 4th Avenue, Room G-61
Anchorage, Alaska 99501-2249

In reply refer to:
AFWFO

November 24, 2009

Mr. Michael Salyer, Chief
Environmental Resources Section
U.S. Army Engineer District, Alaska
P.O. Box 6898
Anchorage, Alaska 99506-0898

Re: Second Amendment to the Biological Opinion on the Effects of Harbor Improvements at Akutan, Alaska (***Previously*** *consultation number 2002-0004;* **Now** *consultation number 2007-0130*)

Dear Mr. Sayler,

This letter serves as the second amendment to the Biological Opinion on the Effects of Harbor Improvements at Akutan, Alaska on Steller's eiders (*Polysticta stelleri*) issued to the Army Corps of Engineers (ACOE) on September 2, 2003 (consultation number 2002-0004). The first amendment, issued on May 30, 2007 (consultation number 2007-0130), concurred with the ACOE's determination that the harbor improvements at Akutan Harbor is not likely to adversely affect the southwest Alaska distinct population segment (DPS) of the northern sea otter (*Enhydra lutris kenyoni*). The southwest DPS of northern sea otter was listed as threatened under the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended, 16 U.S.C. 1531 *et seq*) on August 9, 2005. This second amendment replies to the ACOE's request for concurrence with the determination that the construction of a harbor at the head of Akutan Harbor will not adversely modify sea otter critical habitat, which was designated on October 8, 2009 (Figure 1).

A 57-vessel harbor and entrance channel are proposed for construction at the head of Akutan Harbor. Akutan Harbor is located on Akutan Island in the Fox Island Group of the Aleutian Archipelago. Currently, there is no protected moorage at Akutan, forcing vessels using the Harbor to seek moorage and provisions at other locations.

The proposed harbor is designed to accommodate the larger Bering Sea commercial fishing vessels consisting of trawlers and catcher processors ranging in size from 80 to 160 feet in length. A core fleet of approximately 76 vessels of this size class is associated with the Trident Seafoods plant in Akutan. Nineteen vessels currently using Akutan Harbor will be unable to moor at the proposed harbor and will have to seek moorage at other Aleutian and southwest Alaska harbors or travel to Pacific Northwest harbors.

The overall number of vessels using Akutan Harbor is not expected to change as a result of constructing a new harbor at the head of the bay (ACOE 2007). However, vessel traffic patterns will change with the construction and operation of this proposed harbor; vessels will transit the entire length of Akutan Harbor to moor at the head of the bay. Constructing a harbor at the head of Akutan Harbor is expected to reduce the risk of oil spills due to collisions and groundings (ACOE 2007), but most accidental petroleum releases at harbors occur during refueling operations or are a result of equipment failure and operator error (Day and Pritchard 2001).

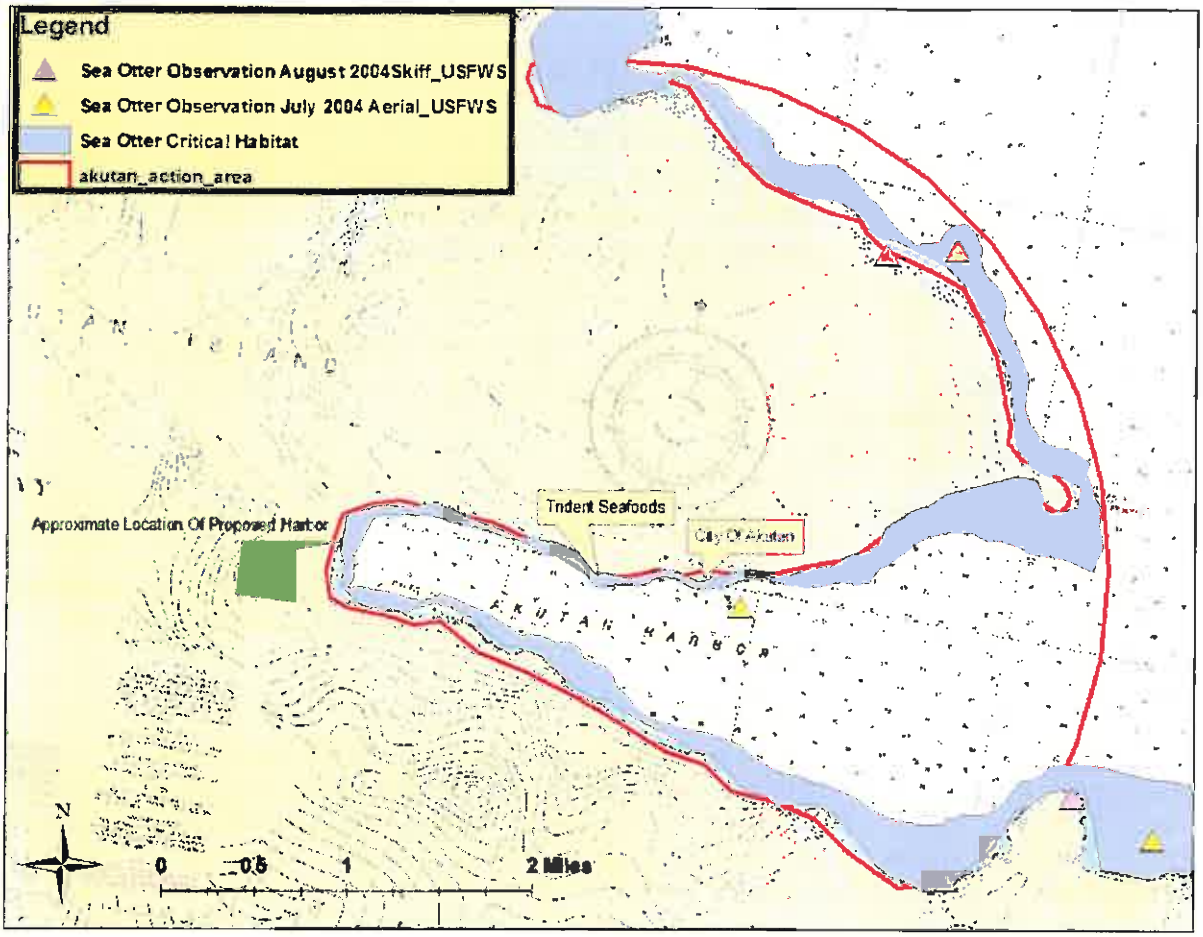

Figure 1. Sea otter observations and critical habitat within the proposed Akutan Harbor action area.

The proposed harbor is expected to occupy 14.9 acres of wetland connected to Akutan Harbor by a 100-foot wide entrance channel that is protected by two breakwaters (one on each side of the channel). The area of the entrance channel is expected to be 1.3 acres, dredged to a depth of 20 feet MLLW. The breakwater jetties and dredged channel together will have a combined footprint of about 3.36 acres.

The Biological Assessment on effects of harbor construction on sea otter at Akutan (ACOE 2007) identified two potential impacts to sea otter habitat as a result of the proposed harbor construction and operation: 1) direct long and short-term loss of foraging habitat due to construction of breakwater jetties and dredging the inter/sub tidal habitat; and 2) indirect effects from the reduction of prey abundance quantity or quality due to contaminants.

To address concerns regarding existing and future contamination in the near shore habitat of Akutan Harbor and its effects on listed species, ACOE conducted pre-construction contaminant sampling in 2008 (ACOE 2009). Low, but detectable concentrations of numerous polycyclic aromatic hydrocarbon compounds (PAHs) were in all sediment samples, including the control site (Site 1; Appendix I). Few low-molecular-weight PAHs (naphthalenes and phenanthrene) were detected in some mussel samples. However, results from this mussel collection are suspect due to inadvertent thawing of some of the samples (ACOE 2009). Low concentrations of mercury were detected in all sediment samples except the control site. But, mercury was detected in mussel tissue from all 6 locations (including the control site). No PCBs were detected in any sample. Based on these results, we conclude that the water quality at Akutan Harbor has been compromised by seafood processing waste (ADEC 2006) and petroleum hydrocarbon spills (Day and Pritchard 2001, ACOE 2009).

Sea otters are carnivores that primarily eat benthic invertebrates including sea urchins, clams, mussels, crabs, and octopus (Estes et al. 1982; Estes 1990). Chronic exposure of sea urchins to diesel fuel reduces their reproductive success (Zhadan and Vaschenko 1993). Crabs and shellfish lack the detoxification enzymes needed to rid themselves of petroleum hydrocarbons; such organisms bioaccumulate oil but depurate it over a period of several weeks (Malins and Ann 1997, NOAA 2007). We surmise that current contaminant loads in Akutan harbor have affected the near shore prey base quality, and possibly quantity, for sea otters. Prey availability may be reduced or sea otters may chronically ingest low concentrations of fuel oil that bioaccumulate in prey species (ACOE 2009). Chronic ingestion of low concentrations of petroleum hydrocarbons may cause negative systemic effects to sea otters, as has been shown in mink (*Mustela vison*; Schwartz et al. 2004).

As per Terms and Conditions established in the Biological Opinion issued in 2002 and the subsequent amendment, post-construction sampling will occur at the harbor site in years 1 and 4 of harbor operation to assess changes in petroleum hydrocarbon levels. A summary report of the hydrocarbon monitoring results shall be submitted to the Service by July 15th of the year following the monitoring efforts (i.e., preconstruction, 1-year post construction, and 4-years post construction).

Your recent letter states that although habitat will be directly impacted by the footprint of the harbor expansion project in Akutan Harbor, the reduction in feeding or resting habitat would not constitute a finding of adverse modification of critical habitat. A loss of 3.36 acres (0.013 km^2) represents a very small fraction of the 15,164 km^2 of sea otter critical habitat. The Service believes that a loss of such as small amount of near shore habitat will not significantly compromise the functionality of critical habitat as a whole. Therefore, the Service concurs with your determination that construction and operation of a harbor at the head of Akutan Harbor is not likely to adversely modify critical habitat designated under the ESA for the southwest Alaska DPS of northern sea otter. Therefore, your section 7(a)(2) obligations have been satisfied. However, obligations under section 7 of the ESA must be reconsidered if new information reveals project impacts that may affect listed species or critical habitat in a manner not previously considered, if this action is subsequently modified in a manner which was not considered in this assessment, or if a new species is listed or critical habitat is designated that may be affected by the identified action.

This consultation relates only to federally listed or proposed species and/or designated or proposed critical habitat under our jurisdiction. It does not address species under the jurisdiction of National Marine Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act, Migratory Bird Treaty Act, or Bald and Golden Eagle Protection Act.

Thank you for your cooperation in meeting our joint responsibilities under section 7 of the ESA. If you have any questions, please contact me at (907) 271-2787 or Ellen Lance at (907) 271-1467. In future correspondences regarding this consultation please refer to consultation number 2007-0130.

Sincerely,

Ann G. Rappoport
Field Supervisor

Cc: Chris Hoffman, ACOE

Appendix I. 2008 contaminants sampling locations (ACOE 2009).

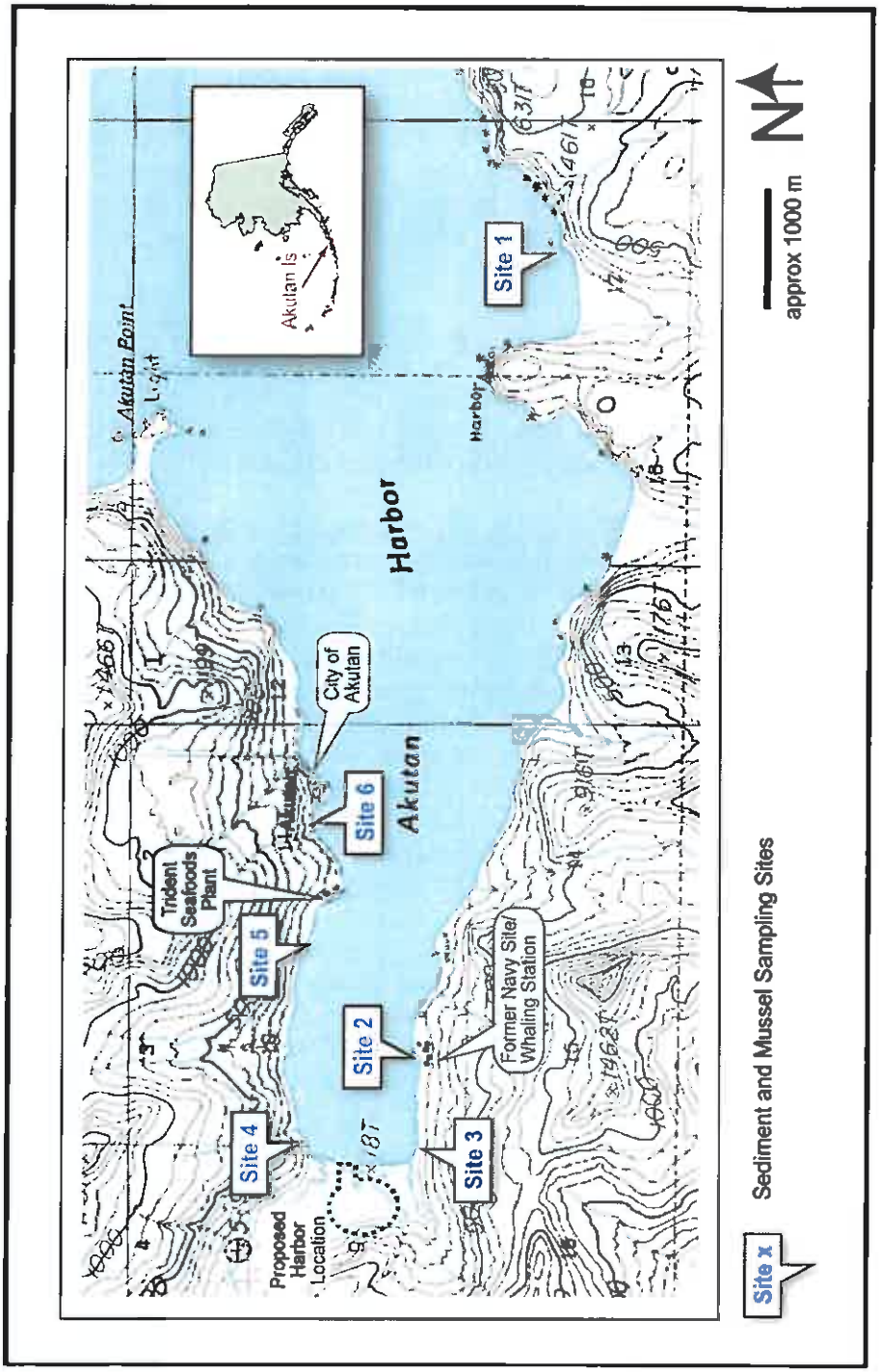

Figure 1. Akutan Bay sampling locations.

Literature Cited

[ACOE] Army Corps of Engineers. 2007. Biological assessment of the sea otter *Enyhdra lutris* for harbor construction at Akutan, Alaska. Unpublished report submitted to the USFWS, Anchorage Fish and Wildlife Field Office, Anchorage, Alaska.

-----. 2009. Sediment and mussel sampling and analysis, baseline POL monitoring of proposed harbor site, June 2008, Akutan, Alaska. United States Army Corps of Engineers, Alaska District, Elmendorf Air Force Base, Alaska.

[ADEC] Alaska Department of Environmental Conservation. 2006. Alaska's final 2004 integrated water quality monitoring and assessment report, April 2006. Alaska Department of Environmental Conservation, Juneau, Alaska.

Day RH, Pritchard AK. 2001. Literature search for Steller's eider study: Task 2b. Review of harbors spills. Prepared for the U.S. Army Enineer District, Alaska. Contract # DACA85-00-D-0001.

Estes JA. 1990. Growth and equilibrium in sea otter populations. Journal of Animal Ecology 59:385-401.

Estes JA, Jameson RJ, Rhode EB. 1982. Activity and prey selection in the sea otter: influence of population status on community structure. American Naturalist. 120:242-258.

Malins D, Ann C. 1997. NY Acad Sci 298: 482-496, as cited in: Health and Welfare Canada: Polycyclic Aromatic hydrocarbons p.37 (1979) Report No. 80-EHD-50.

[NOAA] National Oceanic and Atmospheric Administration. Fact sheet: small diesel spills (500-5000 gallons). http://archive.orr.noaa.gov/oilaids/diesel.pdf, accessed 5/16/2007.

Schwartz JA, Aldridge BM, Lasley BL, Snyder PW, Stott JL, Mohr FC. 2004. Chronic fuel oil toxicity in American mink (*Mustela vison*): systemic and hematological effects of ingestion of a low-concentration of bunker C fuel oil. Toxicology and Applied Pharmacology 200: 146-158.

Zhadan PM, Vaschenko MA. 1993. Effects of diesel fuel hydrocarbons on embryogenesis and super (45) Ca super (2+) uptake by unfertilized eggs of sea urchin *Strongylocentrotus intermedius*. Comparative Biochemistry and Physiology. 105:543-548.

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FILE COPY

MAY 30 2007

In reply refer to
AFWFO

Guy R. McConnell
U.S. Army Engineer District, Alaska
P.O. Box 6898
Anchorage, Alaska 99506-0898

Re: Amendment to the Biological Opinion (***Previously** consultation number 2002-0004*) on the Effects of Harbor Improvements at Akutan, Alaska (***Hereafter** consultation number 2007-F-0130*)

Dear Mr. McConnell,

This letter serves as an amendment to the Biological Opinion on the Effects of Harbor Improvements at Akutan, Alaska on Steller's eiders (*Polysticta stelleri*) issued to the Army Corps of Engineers (ACOE) on September 2, 2003. It also serves as a concurrence for your determination that this project is not likely to adversely affect the southwest Alaska distinct population segment (DPS) of the northern sea otter (*Enhydra lutris kenyoni*). Since the original Biological Opinion was issued for Steller's eiders, the southwest DPS of northern sea otter was listed as threatened (August 9, 2005) under the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended, 16 U.S.C. 1531 *et seq*).

On March 20, 2007, we received your Biological Assessment of the potential effects of harbor improvements at Akutan on sea otters and your letter requesting concurrence with the determination that construction and operation of a harbor at the head of Akutan Harbor may affect but is not likely to adversely affect the southwest Alaska DPS of northern sea otter. Further, on April 17, 2007 we received your letter informing us of a change to the Akutan harbor project. This change entails a 235-foot move of the harbor footprint, resulting in some changes to the project design. You also informed us of a correction in the calculation of the harbor basin area. As per our telephone conversation on May 18, 2007, consideration of both the effects of the harbor project on sea otters and the harbor design change will be addressed in this amendment.

A 57-vessel harbor and entrance channel are proposed for construction at the head of Akutan Harbor. Akutan Harbor is located on Akutan Island in the Fox Island Group of the Aleutian Archipelago. Currently, there is no protected moorage at Akutan forcing vessels using the Harbor to seek moorage and provisions at other locations.

The proposed harbor would be designed to accommodate the larger Bering Sea commercial fishing vessels consisting of trawlers and catcher processors ranging in size from 80 to 160 feet

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in length. A core fleet of approximately 76 vessels of this size class is associated with the Trident Seafoods plant in Akutan. Nineteen vessels currently using Akutan Harbor will be unable to moor at the proposed harbor and will have to seek moorage at other Aleutian and southwest Alaska harbors or travel to Pacific Northwest harbors.

The overall numbers of vessels using Akutan Harbor is not expected to change as a result of constructing a new harbor at the head of the bay (ACOE 2007). However, vessel traffic patterns will change with the construction and operation of this proposed harbor; vessels will transit the entire length of Akutan Harbor to moor at the head of the bay. Constructing a harbor at the head of Akutan Harbor is expected to reduce the risk of oil spills due to collisions and groundings (ACOE 2007), but most accidental petroleum releases at harbors occur during refueling operations or are a result of equipment failure and operator error (Day and Pritchard 2001a).

The proposed harbor is expected to occupy 14.9 acres of wetland connected to Akutan Harbor by a 100-foot wide entrance channel that is protected by two breakwaters (one on each side of the channel). The area of the entrance channel is expected to be 1.3 acres, dredged to a depth of 20 feet MLLW. The recent shift of the harbor 235 feet south of the original location will eliminate the need to relocate "Rust Creek".

Effects of the Project Change

The Service does not anticipate significant changes to the effects of this project on listed Steller's eiders as a result of the shift of the harbor footprint and other minor modifications. We continue to affirm that this project is not likely to jeopardize the continued existence of the Steller's eider, and is not likely to destroy or adversely modify designated critical habitat. Further, the Service continues to anticipate that petroleum releases will occur in association with the legal operation of the harbor due to operator error, equipment failure, sunken vessels, and contaminated bilge water discharges, and that Steller's eiders are likely to strike harbor associated structures and vessels. The estimates for incidental take of Steller's eiders as a result of petroleum releases and structure strikes remains unchanged. The Incidental Take Permit anticipates a take of 10 Steller's eiders from the listed Alaska breeding population. All Reasonable and Prudent Measures and Terms and Conditions established in the 2002 issuance of the Biological Opinion still apply.

Effects of the Proposed Harbor on the Northern Sea Otter

The Biological Assessment on effects of harbor construction on sea otters at Akutan (ACOE 2007) identifies the following potential impacts to sea otters as a result of the proposed harbor construction and operation:

1. Direct long and short-term loss of foraging habitat due to construction of breakwater jetties and dredging the inter/sub tidal habitat;
2. Indirect effects from the reduction of prey abundance quantity or quality due to contaminants;
3. Disturbance or displacement due to construction activities;
4. Direct effects from oil spills.

In February of 2004, 23 sea otters were observed (within the proposed harbor action area; USFWS 2002) incidental to a survey of Steller's eiders (HDR 2004). Twenty of those otters were seen along the southern coastline of Akutan Harbor, from the head of the harbor to the east. Other survey data suggested that only a few otters use the harbor action area (Figure 1; HDR 2006; USFWS, Marine Mammals Management, unpublished data, 1992, 2000, 2004).

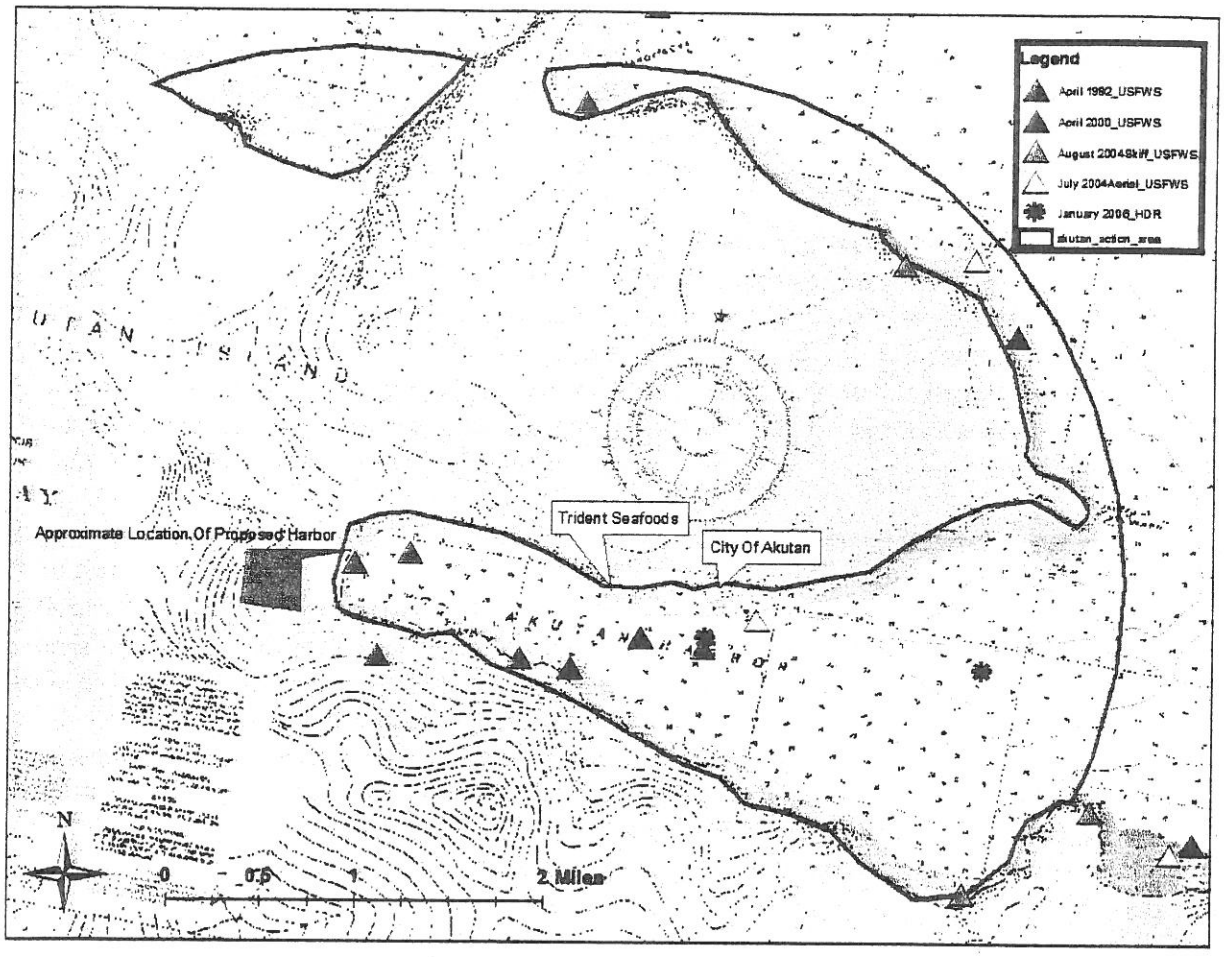

Figure 1. Sea otter observations within the proposed Akutan Harbor action area.

Reportedly, there is abundant sea life in the near shore environment of Akutan Island. The proposed harbor will result in the direct loss of 1.3 acres of near shore habitat that may be important foraging habitat for the otters using the head of the Harbor. Water quality at Akutan Harbor however, has been compromised by seafood processing waste (ADEC 2006) and possibly by petroleum hydrocarbons (Day and Pritchard 2001).

In a study of oil spills at 10 harbors in Alaska (1990 through 1999), both the number of spills and the amount of material spilled were greatest at 3 harbors with the greatest ship traffic (Day and Pritchard 2001a). One of those 3 harbors was Akutan. In 1995, 10,000 gallons of diesel fuel was spilled into Akutan Harbor. Indeed, in a comparison of spills at 9 other harbors, the amount spilled was higher than expected in Akutan due to a higher than expected number of large spills

(Day and Pritchard 2001b). Akutan ranked second, behind only Dutch Harbor, for mean number of gallons spilled each year (1167.4 gallons for all materials spilled in Akutan Harbor; Day and Pritchard 2001a).

Sea otters are carnivores that primarily eat benthic invertebrates including sea urchins, clams, mussels, crabs, and octopus (Estes and others 1982; Estes 1990). Chronic exposure of sea urchins to diesel fuel reduces their reproductive success (Zhadan and Vaschenko 1993). Crabs and shellfish lack the detoxification enzymes needed to rid themselves of petroleum hydrocarbons; such organisms bioaccumulate oil but depurate it over a period of several weeks (Malins and Ann 1997, NOAA 2007). We surmise that current contaminant loads in Akutan harbor have affected the near shore prey base quality, and possibly quantity, for sea otters.

Day and Pritchard (2001a) concluded that expansion of 10 harbors in Alaska, including Akutan, will result in increased inputs of petroleum related hydrocarbons. Increased chronic petroleum releases expected in the future will likely negatively affect sea otters in a number of ways. Prey availability may be reduced or sea otters may chronically ingest low concentrations of fuel oil that bioaccumulate in prey species. Chronic ingestion of low concentrations of petroleum hydrocarbons may cause negative systemic effects to sea otters, as has been shown in mink (*Mustela vison*; Schwartz and others 2004).

The proposed new harbor is designed to facilitate quick response to spills that occur inside the harbor and to remedy other pollution issues (ACOE 2007). Armor stones on the breakwater will be fitted with steel rings or other devices to which absorbent booms can be rapidly attached in the event of a spill. Oil spill response equipment will be kept at the harbor. Best Management Practices, that include a manual for prevention of pollution in the harbor, will be adopted. The project sponsor will be encouraged to obtain membership with an Oil Spill Response Organization. A boat grid is not planned for the harbor; vessel hulls will not be scraped and painted there, reducing the risk of near shore contamination by tributyltin, an antifouling agent in bottom paint. Battery collection stations will be established at the harbor to facilitate convenient deposition of lead-acid batteries for disposal.

As per an email sent on May 23, 2007, by Bret Walters, pre-construction and post-construction contaminants sampling will occur at the proposed harbor site. This sampling effort, which will examine petroleum hydrocarbon contamination in sediments and mussels at the head of the harbor, will provide valuable information about the current habitat conditions by which to gauge potential future changes. Further, this measure is congruent with the Term and Condition (T&C) established in the Biological Opinion for the effects on Steller's eiders issued in 2002:
The following Term and Conditions shall implement Reasonable and Prudent Measure No. 3: "The USACOE shall monitor impacts of harbor operation to Steller's eiders."

3.1. *The USACOE shall monitor the releases of petroleum at existing harbor facilities and at the proposed mooring basin. The USACOE shall coordinate with the U.S. Fish and Wildlife Service on the study design for this monitoring effort prior to its initiation. The Service and COE are currently developing applicable methods. Petroleum release monitoring shall occur pre-construction and post-construction in years 1 and 4 of harbor operation. A summary report shall be submitted to the Service annually. After*

these sampling periods, the monitoring terms will be re-evaluated by the Service and COE.

We offer the following clarification to the above term and condition. A summary report of the hydrocarbon monitoring results shall be submitted to the Service by July 15th of the year following the monitoring efforts (i.e., preconstruction, 1-year post construction, and 4-years post construction).

Sea otters currently occupying Akutan Harbor are likely habituated to steady boat traffic (ACOE 2007), and therefore will not suffer significant, additional disturbance due to vessels using the new harbor. Disturbance due to harbor construction will be short-term and small in scale. The ACOE has built several features into the harbor design with the intent of reducing the risk that contaminants will enter the marine environment. But efforts to monitor for hydrocarbons both pre and post-construction will provide necessary data to assess risk to otters in the future. Based on the stated measures for the Akutan Harbor project, the Service concurs with your determination that construction and operation of a harbor at the head of Akutan Harbor is not likely to adversely affect the southwest Alaska DPS of northern sea otter. Therefore, your section 7(a)(2) obligations have been satisfied. However, obligations under section 7 of the ESA must be reconsidered if new information reveals project impacts that may affect listed species or critical habitat in a manner not previously considered, if this action is subsequently modified in a manner which was not considered in this assessment, or if a new species is listed or critical habitat is designated that may be affected by the identified action.

This consultation relates only to federally listed or proposed species and/or designated or proposed critical habitat under our jurisdiction. It does not address species under the jurisdiction of National Marine Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act, Migratory Bird Treaty Act, or Bald and Golden Eagle Protection Act.

Thank you for your cooperation in meeting our joint responsibilities under section 7 of the ESA. If you have any questions, please contact me at (907) 271-2787 or Ellen Lance at (907) 271-1467. In future correspondences regarding this consultation please refer to consultation number 2007-F-0130.

Sincerely,

Ann G. Rappoport
Field Supervisor

Cc: Pamela Bergman, Office of Environmental Policy and Compliance

Literature Cited

[ACOE] Army Corps of Engineers. 2007. Biological assessment of the sea otter *Enyhdra lutris* for harbor construction at Akutan, Alaska. Unpublished report submitted to the USFWS, Anchorage Fish and Wildlife Field Office, Anchorage, Alaska.

[ADEC] Alaska Department of Environmental Conservation. 2006. Alaska's final 2004 integrated water quality monitoring and assessment report, April 2006. Alaska Department of Environmental Conservation, Juneau, Alaska.

Day RH, Pritchard AK. 2001a. Literature search for Steller's eider study: Task 2b. Review of harbors spills. Prepared for the U.S. Army Enineer District, Alaska. Contract # DACA85-00-D-0001.

Day RH, Pritchard AK. 2001b. Literature search for Steller's eider study: Task 2c. Estimated future spills. Prepared for the U.S. Army Enineer District, Alaska. Contract # DACA85-00-D-0001.

Estes JA. 1990. Growth and equilibrium in sea otter populations. Journal of Animal Ecology 59:385-401.

Estes JA, Jameson RJ, Rhode EB. 1982. Activity and prey selection in the sea otter: influence of population status on community structure. American Naturalist. 120:242-258.

HDR Alaska, Inc. 2004. Akutan Airport Steller's Eider Winter Surveys. Unpublished report prepared for State of Alaska Department of Transportation and Public Facilities P.O. Box 196900 Anchorage, AK 99519-6900. 11 pp

HDR Alaska, Inc. 2006. Biological Assessment of Steller's Eider *Polysticta stelleri* (Pallas) for Akutan Airport. Unpublished report prepared for State of Alaska Department of Transportation and Public Facilities P.O. Box 196900 Anchorage, AK 99519-6900. 44pp.

Malins D, Ann C. 1997. NY Acad Sci 298: 482-496, as cited in: Health and Welfare Canada; Polycyclic Aromatic hydrocarbons p.37 (1979) Report No. 80-EHD-50.

[NOAA] National Oceanic and Atmospheric Administration. Fact sheet: small diesel spills (500-5000 gallons). http://archive.orr.noaa.gov/oilaids/diesel.pdf, accessed 5/16/2007.

Schwartz JA, Aldridge BM, Lasley BL, Snyder PW, Stott JL, Mohr FC. 2004. Chronic fuel oil toxicity in American mink (*Mustela vison*): systemic and hematological effects of ingestion of a low-concentration of bunker C fuel oil. Toxicology and Applied Pharmacology 200: 146-158.

Zhadan PM, Vaschenko MA. 1993. Effects of diesel fuel hydrocarbons on embryogenesis and super (45) Ca super (2+) uptake by unfertilized eggs of sea urchin *Strongylocentrotus intermedius*. Comparative Biochemistry and Physiology, 105:543-548.

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BIOLOGICAL OPINION
on the Effects of Harbor Improvements at Akutan, Alaska,
on the Threatened Steller's Eider (*Polysticta stelleri*)

DESCRIPTION OF PROPOSED ACTION

A 57-vessel mooring basin and entrance channel are proposed for construction at the head of Akutan Harbor, Alaska, at 54°08' north latitude, 165°46' west longitude. Akutan Harbor is located on Akutan Island in the Fox Island Group of the Aleutian Archipelago. Currently, there is no protected moorage at Akutan forcing vessels using the Harbor to seek moorage and provisions at other locations.

The proposed mooring basin would be designed to accommodate the larger Bering Sea commercial fishing vessels consisting of trawlers and catch processors ranging in size from 80 to 160 feet in length currently using Akutan Harbor. A core fleet of approximately 76 vessels of this size class is associated with the Trident Seafoods plant in Akutan. Those vessels, of which there are approximately 19, unable to moor at the proposed mooring basin would have to seek moorage at other Aleutian and southwest Alaska harbors or travel to Pacific Northwest harbors. Future harbor expansions designed to accommodate these or additional vessels are precluded by environmental and engineering constraints and exorbitant construction costs.

Construction of the proposed mooring basin involves creating an inland basin by dredging approximately 750,000 cubic yards of material from a large wetland complex located behind a large vegetated berm at the head of the bay. A portion of the berm would be breached for the construction of an entrance channel. Proposed navigation improvements at Akutan would have a footprint of 65 acres of wetland habitat. Following are the main harbor project features and their approximate acreages:

- A 12-acre, 57-vessel mooring basin dredged to between 14 and 18 feet mean lower low water (MLLW).
- A 4.2-acre (200-foot-wide, 300-foot-long) entrance channel dredged to a depth of 20 feet MLLW.
- Two, 500-foot-long rubble mound jetties (8-acre total) along the entrance channel.
- Approximately 40 acres of uplands constructed from about 750,000 cubic yards of dredged disposal material.
- A 2-acre spur road connecting the harbor to a proposed road connecting the community of Akutan to a proposed airport site.
- Approximately 3 acres of the upland area would be available for equipment storage and other harbor-support-related facilities.

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 (Chris Dau, pers. comm. 2000).

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 on reliance of caloric reserves. Under this life history strategy, the 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. We note that 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, pers. comm. 2000). In addition, female Steller's eiders must continue to feed during incubation. In contrast, 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 pair 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, as in Cooke et al. 2000).

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 2 to 10 eggs (Bent 1987, Bellrose 1980, Quakenbush et al. 1995). The average clutch size of successful nests near Barrow is reported as 5.5. Solovieva (1997), found that clutch size for Steller's eiders on the Lena Delta varied between 5 and 8 eggs with an average of 6.1 (n = 32). Nesting success near Barrow (percent of nests with at least one egg hatching) is variable, ranging from 8.8% (Obritschkewitsch et al. 2001) to 29% (Quakenbush et al. 2001).

Near Barrow, Steller's eiders occur regularly, although abundance and breeding effort vary widely from year to year. Between 1991 and 1999, Steller's eiders nested in only six years (1991, 1993, 1995, 1996, 1997 and 1999) (Quakenbush et al. 2001). Periodic nonbreeding of Steller's eiders may be related to the response of predators to fluctuations in brown lemming (*Lemmus trimucronatus*) abundance (Quakenbush et al. 2001). Five of the six nesting years in that study coincided with lemming populations high enough to support nesting snowy owls and pomarine jaegers, the one exception being 1997. None of the four nests found in 1997, a low lemming year, were successful. Behavior of Steller's eiders is less predictable in non-nesting years when birds may disappear from terrestrial (non-marine) sites in early June (1998), or may remain grouped in terrestrial habitats for several weeks (1994) (Quakenbush et al. 2001). The degree to which these reproductive parameters are representative of what occurs elsewhere in Alaska (outside of the Barrow Area) is not known.

Hatching Success

Near Barrow, 83.3% (5 of 6) of Steller's eiders nests with eggs hatched in 1991, 20.0% (4 of 20) hatched in 1993 (Quakenbush et al. 1995), and 15% (3 of 20) hatched in 2000 (Philip Martin, Service, pers. comm., 2000). In other years, Steller's eiders did not even attempt to breed near Barrow (Quakenbush et al. 1995).

Fledging Rate

Of the 15% of nests that produce at least one chick, 7% (1 in 14) had chicks survive to an age at which fledging appeared likely (Phillip Martin, USFWS, pers. comm. 2003).

Consequently, only about 1 in 100 Steller's eider nests from the Barrow area have produced fledging-aged young in recent years.

Recruitment

Steller's eider recruitment rate (the percentage of fledged birds that reach sexual maturity) is unknown, but has been low in recent times, owing to low fledging rates.

Seasonal Distribution Patterns

Banded and Satellite-Tagged Alaskan Breeding Birds

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 Izembek 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.).

Breeding Distribution

Three breeding populations of Steller's eiders are recognized, two in Arctic Russia and one in Alaska. The Russian Atlantic population breeds in western Russia and winters in the north Atlantic Ocean while the Russian Pacific population nests in eastern Russia and winters in the southern Bering Sea, including southwest Alaska. 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). 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 1989), 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 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. 2000). 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 of Steller's eiders are thought to molt in four areas along the Alaska Peninsula: Izembek Lagoon (Metzner 1993; Dau 1987; Laubhan and Metzner 1999), Nelson Lagoon, Herendeen Bay, and Port Moller (Gill et al. 1981; Petersen 1981; Dau 1999). 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 surveyed Alaska Peninsula coastline during winter 2002. Most of the birds were concentrated within relatively small portions of the coastal waters. Much of the population that is detected during spring migration was not detected on this survey. We conclude that either the survey failed to detect many birds in the survey area, or many Steller's eiders are wintering further west in the Aleutian Islands and/or along the south side of the Alaska Peninsula. We suspect the latter.

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. com. 2000). Interestingly, despite many daytime aerial surveys, Steller's eiders have never been observed during migratory flights (William Larned pers. com. 2000). Larned (1998) concluded that Steller's eiders show strong site fidelity to "favored" habitats during migration, where they congregate in large numbers to feed before continuing their northward migration.

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, and 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. 2000).

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, Biological Resource Division, pers. comm. 1999). Banding data from the Barrow area suggests some level of site fidelity for Steller's eiders breeding there as well (Quakenbush et al. 1995; Martin, FWS, pers. comm. 2000). Interestingly, natal philopatry has not been observed in Steller's eiders nesting in Russia (D. Solovieva, Zoological Institute, Russian Academy of Science, pers. comm. 2000).

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, Robertsen 1997, Robertson et al. 1999).

Preliminary evidence suggests that Steller's eiders also show fidelity for over wintering sites. Satellite transmitters were placed on four Steller's eiders captured in Barrow, Alaska in the summer of 2000. The transmitters ceased functioning for two of these birds prior to the over wintering season. Of the remaining two eiders with transmitters, one over wintered in the Sanak Islands and the other over wintered in the Hook Bay portion of Bechevin Bay. Although these two birds over wintered in different locations, both eiders remained in their respective locations from November 2000 through February 2001. Their use area was small, only a few square kilometers (Philip Martin, FWS, pers.comm., 2001).

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 April 2001 trip report). 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 that general area, but appeared to use a larger home range. 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

While Steller's eiders exhibit strong fidelity to their molting grounds (Flint et al. 2000), nest site fidelity is not similarly displayed (Dearing 2003). Using DNA fingerprinting techniques to individually identify female Steller's eiders nesting in the Barrow area between 1991 and 1999, Dearing (2003) was unable to detect subsequent renesting of "marked" individuals within the area sampled. However, Dearing (2003) found genetic similarities among nests sampled year after year, and concluded the relatedness was due to offspring, siblings or otherwise closely-related individuals nesting in the Barrow area. Moreover, Dearing (2003) concluded that different groups of Steller's eiders arrive to nest in Barrow from year to year, and that Steller's eiders nesting in the Barrow area are not likely to comprise a single population, but may represent a nesting location on the periphery of the main breeding grounds in Siberia.

Preliminary results of a population genetics study, using microsatellite and mtDNA, found no evidence for population structure among Pacific breeding Steller's eiders (Pearce et al. 2003). Similar nuclear allele and mtDNA haplotype frequencies were observed among all sampling areas within the Pacific population. Lack of population structure between these areas suggests gene flow, but it could also reflect common ancestry and insufficient time since divergence for genetic differences to be detected with the markers used (J. Pearce, Alaska Science Center, pers. comm.). These hypothesized causations can be tested statistically, and the results of these tests are expected in the final report for this study.

No significant inbreeding was detected among Steller's eiders from four breeding populations: Western arctic, Indigirka River, Lena River, and Alaska (Pearce et al. 2003). Steller's eiders collected on wintering grounds in Norway are assumed to represent breeding birds from the Western arctic breeding population. This assumption is supported by satellite telemetry data (M. Petersen, Alaska Science Center, unpublished data). Significant genetic differentiation between the Western arctic and Alaskan breeding populations was detected using nuclear loci ($2_{ST} = 0.01$, $P < 0.001$) and mtDNA ($M_{ST} = 0.131$, $P < 0.05$), suggesting that the populations at the extreme ends of the breeding range are likely reproductively isolated or, alternatively, that gene flow does not occur at a level that homogenizes gene frequencies between these distant populations (Pearce et al. 2003).

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); 4 species of bivalves (18.5%); 12 species of crustaceans (13%); and 2 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 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., 1999). In fall and winter, bald eagles (*Haliaeetus leucocephalus*) are important predators of Steller's eiders (McKinney 1965).

Population Dynamics

Population Size

Population sizes are only imprecisely known. The Russian Atlantic population is estimated at 30,000 to 50,000 individuals, and the Russian Pacific population likely numbers 50,000 to 60,000. The threatened Alaska-breeding population is thought to include hundreds or low thousands on the Arctic Coastal Plain, and possibly tens or hundreds on the Yukon-Kuskokwim Delta.

Yukon-Kuskokwim Delta

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 Arctic Coastal Plain indicate that the population sizes of eiders (*Polysticta 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 (Table 1) (Paul Flint, USGS, pers. comm. 1999). In no single year have biologists found more than three nests there, 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 Deltaelta each year (Tim Bowman, Service, Anchorage, 2003, 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 (Paul Flint pers. comm. 1999)

Year	General Location	Number of Pairs	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

Arctic Coastal Plain/North Slope

Aerial surveys provide the best estimate of Steller's eider population size in northern Alaska. The Arctic Coastal Plain Breeding Bird Survey point estimate for Steller's eiders reported by Mallek et al. (2003) from 1989 to 2002 ranged from 0 to 2,543 (Table 2), with a 14-year average of 1,106. The North Slope Eider Surveys, timed to be flown during the spectacled (and Steller's) eider early nesting period (the best time to detect waterfowl breeding population), indicates a smaller Steller's eider breeding population, averaging 168 birds from 1992-2002 (Larned et al. 2003) (Table 2). Caution must be used when interpreting these survey results. Actual population sizes may be underestimated if an unknown proportion of birds are missed during the survey. Conversely, the data may overestimate 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 Arctic Coastal Plain Breeding Bird Survey from 1989-2002 (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 et al. 2001).

Table 2. Aerial population estimates from aerial breeding pair surveys (Mallek and King 1999).

Year	Population Estimate 1989 – 2002 (Mallek et al. 2003)	Population Estimate 1992 – 2002 (Larned et al. 2003)	Nesting Status Near Barrow 1991 – 1999 (Quakenbush et al. 2001)
1989	2002		
1990	534		
1991	1118		Nesting
1992	954	0	Non-nesting
1993	1313	262	Nesting
1994	2524	47	Non-nesting
1995	931	281	Nesting
1996	2543	0	Nesting
1997	1295	189	Nesting
1998	281	0	Non-nesting
1999	1250	785	Nesting
2000	563	0	Nesting[1]
2001	176	288	Non-nesting[1]
2002	0	0	Non-nesting[1]

[1](Nora Rojek, USFWS, pers. comm. 28 April 2003)

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 Arctic Coastal Plain may fluctuate dramatically from year to year. 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 population estimates are large enough to obscure relatively large annual population fluctuations. However, ground-based efforts in the Barrow area suggest that local breeding populations there fluctuate dramatically (Quakenbush et al. 1995).

Population Stability

Long life spans, multiple reproductive periods, high reproductive rates, and even-age distributions all have stabilizing affects on populations. The Steller's eider is a relatively long-lived species with low and variable nest success, low duckling survival, and poor overall productivity (Quakenbush et al. 2001, Phillip Martin, pers. comm. 17 April 2003). Although periodic non-breeding is consistent with the reproductive strategy for a long-lived species (Begon and Mortimer 1986), such species do not typically display the high variability measured for North Slope Steller's eiders populations.

The high degree of variability in aerial survey data make detecting anything but the most dramatic trends in the breeding population difficult. Population modeling based on parameters derived from birds breeding in the Barrow area indicates annual declines of 15 to 25% in the Alaska breeding population (Paul Flint, pers. comm. 21 April 2003). However, additional data are needed to develop a predictive model of the North Slope Steller's eider population, as Barrow-area observations may not apply across the species range in northern Alaska, and birds that forego breeding in the Barrow area may attempt to breed elsewhere in some years.

Long term spring survey data suggests a 6.1% annual decline in migrating Steller's eiders ($R^2 = 0.72$; Larned 2003). If a marine-based threat is causing a decline in the Pacific population of Steller's eiders, then it is reasonable to conclude that the Alaska breeding population may also be affected by such a threat.

Status and Distribution

Reasons for Listing

The Alaska breeding population of Steller's eiders was listed as a threatened species on June 11, 1997 (Service 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 (Service 1997).

<u>Habitat Loss</u>
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 (Service 1997). Within the marine distribution of

Steller's eiders, perceived threats include marine transport, commercial fishing, and environmental pollutants (Service 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 (Service 1997). However, the gathering of subsistence harvest information similar to that collected from Natives on the Y-K Delta has met with resistance from Natives on the Arctic Coastal Plain.

Predation

Increased predation by arctic foxes (*Alopex lagopus*) upon eider nests resulting from the early to mid-1980's crash of goose populations is cited as a possible contributing factor to the decline of the Steller's eider on the Y-K Delta (Service 1997). In addition, a decline in fox trapping concurrent with the decline in fur prices may result in at least temporary fox population increases. The potential for increased predation near villages resulting from the associated gull and raven populations was also cited as a potential threat to this species (Service 1997). Research has shown that expanding predatory gull populations take a heavy toll on waterfowl eggs and young (Bowman et al. 1997), although spectacled eider ducklings were not detected as gull prey in this study.

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 (Service 1997) and throughout Alaska.

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 (Service 1997). However, we are unaware of any link between changes in the marine environment and contraction of the eider's breeding range in Alaska (Service 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 2002). Annual spring aerial surveys provide an index of the Pacific Steller's eider population. These long-term survey data suggest a 6.1% annual decline in migrating Steller's eiders ($R^2 = 0.72$; Larned 2003). In addition, comparison of

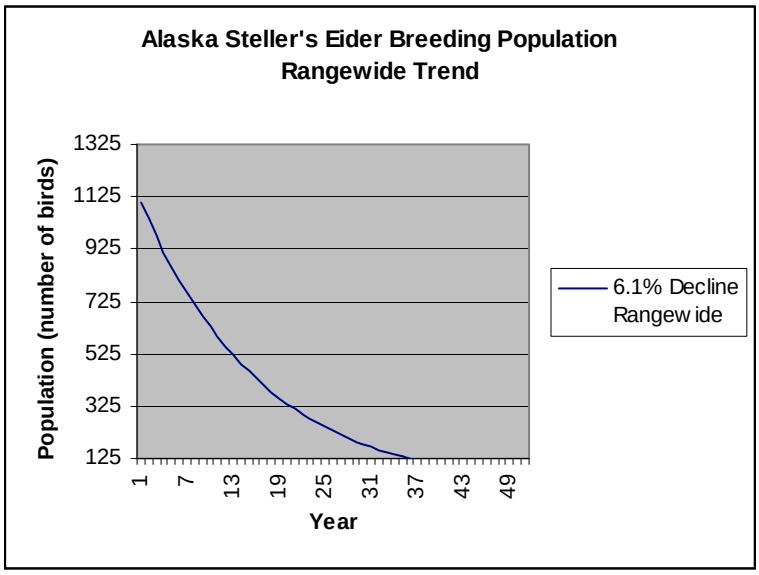
banding data from 1975 -1981 to 1991-1997 indicates a reduction in Steller's eider survival over time (Flint et al, 2000).

The Steller's Eider Recovery Plan (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 ≥ 20% probability of extinction in the next 100 years for 3 consecutive years; OR
> >
> > The population has ≥ 20% probability of extinction in the next 100 years and is decreasing in abundance."

A population viability model is being developed that will be used to estimate the population size corresponding to specific probabilities of extinction. Lacking this more complex stochastic model, we developed a simple deterministic model based on observed annual declines and estimated breeding population size to project population longevity (Figure 1). Based on a 6.1% annual decline (from Larned's spring surveys) and a starting population of 1,106 (the average population point estimate reported by Mallek et al. (2003)), the Alaska breeding population of Steller's eider is expected to reach functional extinction (125 birds) in 35 years.

Figure 1. Projected population size of Steller's eider Alaska breeding population based on range wide 6.1% decline.



IUCN status

Based on the IUCN 2001 Categories and Criteria (version 3.1), 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.

EN

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).

b. an index of abundance appropriate to the taxon.

Evidence: Larned (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 (Service, 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 6.1% 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 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:

v. number of mature individuals

c. Extreme fluctuations in any of the following:

iv. 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 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 of 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.

It is our opinion that this survey provides the best estimate for trend; moreover, we do not have any information indicating that this negative trend does not apply to the Alaska breeding population of Steller's eiders.

New Threats

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 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' prey (e.g., amphipods and snails) (Newey and Seed 1995 as in Glegg et al. 1999, Finley et al. 1999), and to the species itself (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). 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 bioaccumulate in prey items consumed by eiders.

Increased Risk of Lead Poisoning

Because this species continues feeding near the nesting site before and during incubation (D. Solovieva pers. comm. 2000), 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, 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 one night in a storm (Day 2001). Based on the time of year and location, we assume that these birds were 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 5:00pm. In mid-April of 2003, a Steller's eider struck power lines about 20 miles from the Bristol Bay Coast near the intersection of the road to Lake Camp and the road to Rapids Camp. The ceiling was low (close to fog) and it was rainy. Local biologists believe that this happens often, but has simply not been reported in the past (Susan Savage, Alaska Peninsula Becharof NWR, 2003, pers. comm.). Between September 26, 2001, and October 29, 2001, the Northstar facility on the North Slope of Alaska experienced 18 sea duck mortalities and 1 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. Three spectacled eiders died after striking a Coast Guard cutter conducting sampling in the Bering Sea in March 2001. A complete search of fishery observer logbooks for addition data on collisions has not yet been completed.

A complete search of fishery observer logbooks for additional data on collisions has not yet been completed. 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 effect the survival and reproduction of individuals (Goodman 1987) (e.g., shifts in sex ratios, striking wires, being shot, oil/fuel spills). 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, but local groups of wintering birds 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 3), 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.). Furthermore, females represented only 38% and 21% of Steller's eiders captured at Nelson Lagoon over a 3-year period (Flint et al. 2000). This suggests that spatial segregation among sexes, during winter, may lead to assumptions of skewed sex ratio depending on areas surveyed.

Table 3. Shifting sex ratio of Steller's eiders at sample area No. 1 in Izembek Lagoon. Data used are from 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 a skewed sex ratio in Steller's eiders are inconsistent across the range of the species (Table 4). 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 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.

Table 4. 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

Analysis of the Species Likely to be Affected

In summary, decreasing numbers range wide, highly variable reproductive success, winter distribution patterns, suggested fidelity for wintering habitats, and toxic effects to waterfowl from exposure to petroleum compounds all combine to make the Steller's eider vulnerable to the effects of the proposed construction and operation of a mooring basin at the head of Akutan Harbor. Construction of a mooring basin at this location will adversely affect the Steller's eider due to the release of petroleum products into the marine environment resulting in reduced survivorship, direct mortality and subsequent

population declines. In addition, Steller's eiders are vulnerable to injury and mortality due to collisions with vessels and infrastructure associated with the new mooring basin.

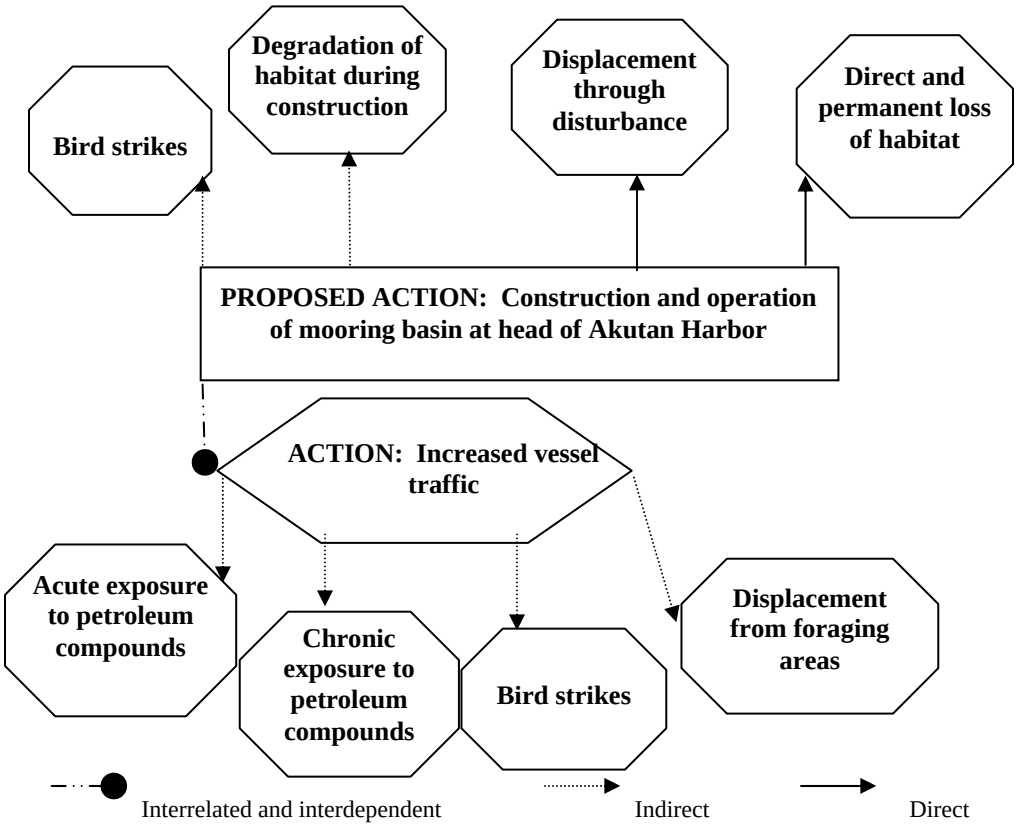
ENVIRONMENTAL BASELINE

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.

Defining the action area of the proposed action is integral to analyzing the effects of past, present, and future actions as well as the proposed action. The action area should be determined based on consideration of all direct and indirect effects of the proposed action, and other activities that are interrelated or interdependent with that action, on the species and/or its critical habitat. Indirect effects are those that are caused by the proposed action and are later in time, but are reasonably certain to occur.

Anticipated increases in the number of vessels present in Akutan Harbor throughout the year as a result of the proposed action represent actions that are interrelated or interdependent with the construction of the proposed mooring basin. Consequently, the action area includes all areas that may be affected directly or indirectly by the activities associated with construction of the proposed mooring basin as well as those areas directly or indirectly affected by the increased vessel traffic within Akutan Harbor (Figure 2).

Figure 2. Potential direct and indirect effects of proposed construction of mooring basin and interrelated and interdependent actions at Akutan Harbor, Alaska.



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).

Rate of Decline for Steller's Eider Populations Wintering in Alaska

For our analysis we are assuming that Steller's eider populations are and will continue to decline annually at a rate of 6.1%. This assumption is based on long-term survey data of migrating Steller's eiders (R^2 = 0.86; Larned 2002).

Patterns of Petroleum Releases

Patterns and conclusions suggested by Day's and Pritchard's (2000) summary of existing information on fuel spills in or near 10 harbors between January 1990 and November 1999 provide basis for the following assumptions regarding future patterns of petroleum releases within the action area.

Spill reporting during the 1990s revealed that the number of reported spills varied dramatically among locations. Spills were most often reported at larger harbors and boat moorages such as Akutan Harbor, Dutch Harbor/Unalaska, and St. Paul Island. In contrast, spills were rarely reported at locations such as Chignik Bay and Perryville; however, when they occurred they were substantial in size. Considering that an estimated 65% of petroleum released into marine waters is due to chronic discharges, and the remaining 35% to massive spills (Maccarone and Brzorad 1994), we assume that some underreporting occurs at all locations, and that petroleum releases are reasonably certain to occur.

Both the number of spills and the amount of material spilled was greatest at the three harbors with greatest ship traffic (Akutan, Dutch Harbor/Unalaska, St. Paul Island); this led the authors to conclude that expansions to the 10 harbors included in the review would result in increased inputs of petroleum hydrocarbons. Consequently, we assume that expansions to existing harbors that will result in an increase in vessel traffic in the action area will lead to an increase of petroleum releases into the environment.

Ninety-seven percent of all reported spills affected water, leading to our assumption that when material is spilled into the environment, marine waters will be most affected.

Both the highest number of spills and the greatest amount of material spilled resulted first from operator error (49% of all spills with known cause) and second from equipment failure (34%). Additionally, most releases appeared to occur during refueling operations. These facts led to the following three assumptions: first, that fueling stations represent a significant source of chronic petroleum contamination; second, that improved fueling standards and institution of best management practices may decrease rates of product loss; and third, that equipment failure and operator error will cause product losses from tank farm infrastructure located outside secondary containment.

Comprising only 2% of all measured material spilled, bilge and waste oil was only a minor component of reported spills. However, it represented 6% of all spills of known type. As a result, we assume that contaminated bilge water discharge represents a potential source of chronic exposure to petroleum compounds.

Diesel fuel accounted for 89% of all measured material spilled and 68% of all spills of known type; thus, we assume that diesel fuel will constitute the majority of material likely to be spilled at harbors and associated facilities.

The frequency of spills according to spill-size category, in descending order, was 1.1 to 15 gallons (42% of all spills), 15.1 – 499 gallons (30% of all spills), trace to 1 gallon (25% of all spills), and spills in excess of 499 gallons (1% of all spills). Therefore, we assume that large spills are rare and sporadic, and that most discharges will be less than 500 gallons.

Affect of Chronic Oiling on Steller's Eiders

For modeling effects, we are assuming that survivorship is reduced annually by 5.7% as a result of chronic petroleum exposure resulting from small, but consistent oil spills, that are reasonably certain to occur. This assumption is based on results from a study comparing harlequin ducks inhabiting oiled verses unoiled bays, more than 6 years after a large oil spill (Esler et al. 2000). Due to the physiological and ecological similarities with harlequin ducks, Steller's eiders are assumed to respond to chronic oiling in a similar way. Moreover, periodic releases of hydrocarbons from oiled beaches in Prince William Sound are assumed to be similar, in effect, to periodic releases of hydrocarbons from fishing vessels and refueling spills. Based on data from Day and Pritchard (2000), diesel and gasoline spills are likely to occur where refueling operations take place over water. It is assumed that the reduced survivorship due to chronic oiling is additive to the annual rate of decline of Steller's eiders wintering in Alaska due to unknown reasons (i.e., 6.1% as described above). For modeling purposes, population growth rates (represented elsewhere by lambda) are assumed equally sensitive to changes in the survival rates of juveniles and adults (Morrison and Pollock 2000, Morrison et al. 1998).

Boundaries of Action Area

In a 15-knot wind and water temperatures of 40 degrees Fahrenheit, only 35% of spilled fuel will evaporate in 4 hours, the duration of tidal movement between high and low tide. Sixty-five percent of the spilled fuel will remain through the entire cycle. Therefore, we assume that maximum potential drift of oil during one tidal cycle from contamination source defines the action area.

Life of the Project

We are assuming the life of the project is 50 years.

Determination of Action Area

Because the number of vessels is not expected to increase in the fishing areas from which fish are typically caught and delivered to Akutan (USACOE 2001), these areas are not included in the action area. However, the number of vessels using Akutan Harbor year round for re-provisioning in addition to temporary and seasonal moorage is expected to increase as a result of the proposed project (USACOE 2001).

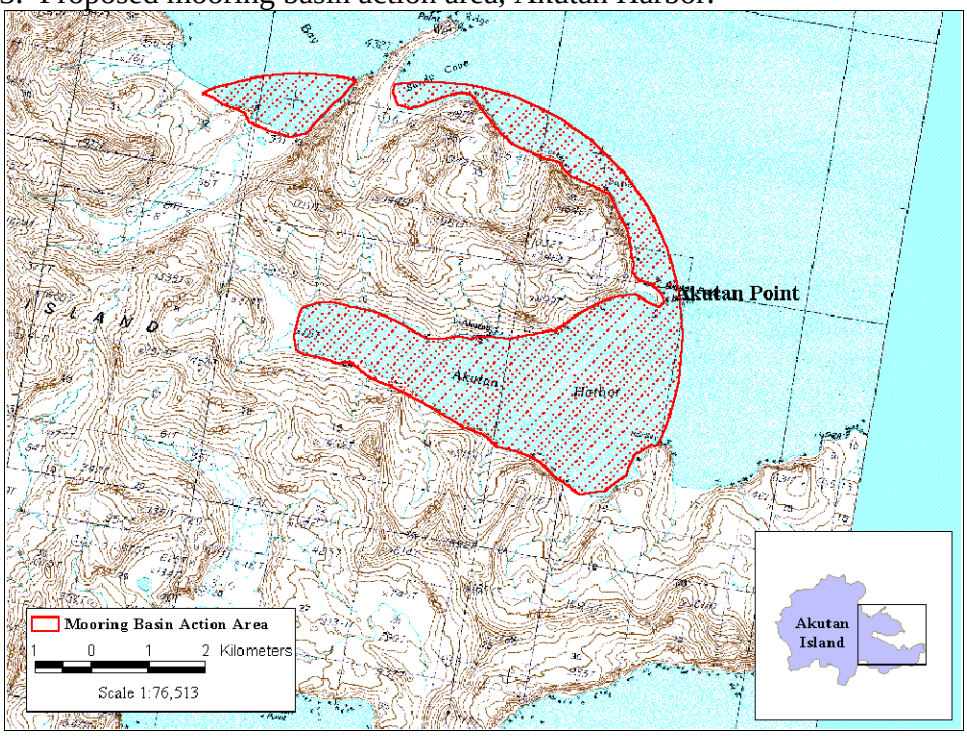
The action area for this project was defined based on the distance an oil spill may travel using the following calculation (John Whitney, NOAA, pers. comm.):

$$D_{nm} = (t_h(C_{nm/h} \pm (W_{nm/h} * 0.03))$$

Where D_{nm}, the linear distance of the spill trajectory (in nautical miles), equals t_h, the duration of oil movement (assumed to be 4 hours) multiplied by the velocity of the oil (the velocity of the current ($C_{nm/h}$) plus/minus the velocity of the wind ($W_{nm/h}$) pushing the oil at the surface (assumed to be 3% of the wind speed)).

Currents and prevailing winds must both be considered when determining the area at risk due to petroleum spills. Oceanographic and meteorological information provided with the biological assessment indicates that tidal currents in Akutan are weak, 1 to 2 cm per second, with winds being the primary force generating surface currents in Akutan Harbor. Currents generated at the water surface from wind are approximately 3 percent of the wind speed (U.S. Fish and Wildlife Service, unpub. info.). USEPA wind roses provided indicate that between October and December west-northwest winds prevail between one and >21 knots. However, winds appear to be much more variable between January and March, including a substantial component of east-southeast winds. Based on a 20-knot wind, the maximum potential drift of oil due to wind-generated currents alone during one tidal cycle in Akutan Harbor would be 2.4 nm [(4h(20nm/h*0.03))]. Therefore, the action area is comprised of the proposed mooring basin and the Trident seafood facility and all marine waters within a 2.4 nm radius of each (Figure 3). However, for the purposes of this analysis, we are limiting our discussion to areas within Akutan Harbor west and south of Akutan Point for two reasons: we determined that this is the area most likely within the travel distance of surface fuel, and we have no data indicating that Steller's eiders utilize the outlying areas circumscribed by the indicated criteria.

Figure 3. Proposed mooring basin action area, Akutan Harbor.



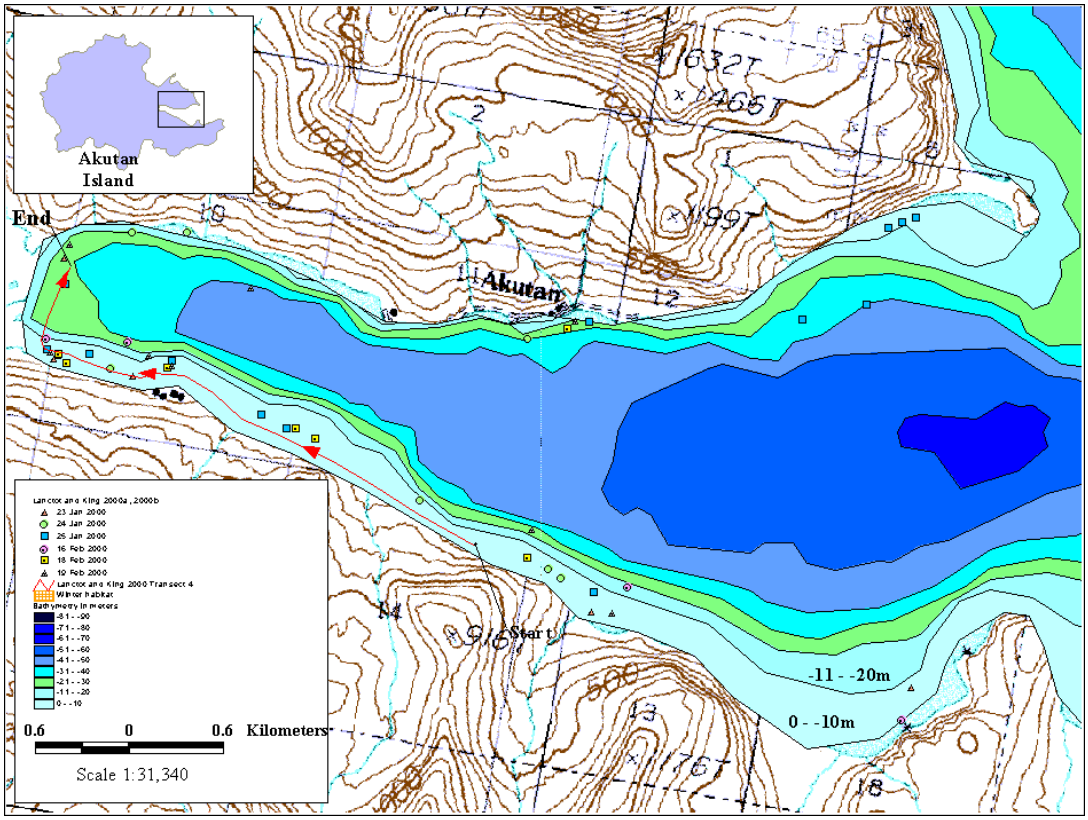
Status of the Species Within the Action Area

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), and January and February 2001 (Schroeder 2001a).

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 (Figure 4). Overall density of Steller's eiders in Akutan Harbor ranged from 69 to 71 birds/km^2, with the highest densities (average 174.6 birds/km^2; range 154.76 to 202.98) always recorded in transect 4 (Figure 4). On 23 January, 57.4% of all birds observed were in transect 4. 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 2000 surveys with additional observations recorded in nearshore waters at Water Source Point and the shoreline east of the city of Akutan. Overall densities ranged from 38.5 to 51.5 birds/km^2, and highest densities (average 156 birds/km^2; range 134.5 to 186.3) were again observed in transect 4 (Figure 4). The majority of eiders during each survey day in February were recorded in transect 4 (77%, 93.2%, 89.7%, 16, 18, and 19 February respectively). Most eiders were found within 50 m of shore.

Figure 4. Steller's eider observations, Akutan Harbor, January and February 2000.



The Service conducted aerial shoreline surveys of areas in the vicinity of six proposed harbor projects including Akutan in 2000 (Larned 2000b). The total estimates for all project survey areas were 6,988 and 2,749 in February and March, respectively. A total of 647 Steller's eiders were observed in the action area of the proposed project on 13 February 2000, and 290 were observed on 9 March 2000.

Similar distribution patterns were observed during shoreline surveys conducted in January and February 2001 (Schroeder 2001a). A minimum of 252 and 199 Steller's eiders were observed in the western half of Akutan Harbor on 22 January 2001 and in mid-February 2001, respectively. As in previous surveys, most eiders were observed along the southern shoreline from its midpoint west, and off the community of Akutan/Salthouse Cove in the morning and evening. A total of 262 Steller's eiders were counted on 18 February 2001, with 80 percent of all eiders observed within Lanctot's and King's (2000a and 2000b) transect 4.

Based on the high estimate of 647 (Larned 2000) Steller's eiders in Akutan Harbor, we estimate that at least 27 birds of the listed population are present in the action area of the proposed project.

Although not designated as critical habitat, Akutan Harbor contains habitat features determined to be essential for the conservation of the species. 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. Of approximately 9.84 miles of coastline within the action area, roughly 8.52 miles are adjacent to suitable Steller's eider winter habitat. Eider winter habitat within the project action area is discontinuous. A total of 682 acres of wintering habitat is distributed over 8 distinct units, with the majority (608 acres) extending eastward from South Creek along the southern coastline of the Harbor (Figure 4).

Factors Affecting Species' Environment Within the Action Area

Seafood Processor Organic Waste

Past and present impacts to Steller's eiders 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 with lighted 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 (USACOE 2001). Accumulations of seafood waste particulates have been observed along the shoreline east and west of the Trident facility. The USEPA has divided Akutan Harbor into two areas: the outer harbor (waters east of longitude 165°46' West) and the inner harbor (waters west of same longitude) (USACOE 2001b). 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 involved in the Bering Sea bottom fish fishery, including 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 was 212.2 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 357.6 gallons of petroleum product annually at Akutan Harbor. At this time, we do not know what effect the spills at Akutan Harbor have had on Steller's eiders.

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.

Incidental Take From Other Federal Actions

<u>Harbor Construction and Improvements</u>
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 collisions 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 5).

<u>Seafood Processing</u>
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 5).

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 5).

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 5).

Research

We estimate that two listed Steller's eiders will be lethally taken per year as a result of research activities (Table 5).

Take resulting from these activities is approximately 10 listed Steller's eiders per year, or 0.9% (10/1106) of the Alaska breeding population. When this additional level of take is incorporated into our population model in an additive fashion above the current annual decline of 6.1% range wide, functional extinction (125 birds) is reached by year 30, approximately 5 years prior to that predicted by a 6.1% annual decline alone (Figure 5).

Figure 5. Steller's eider breeding population prediction with 0.41% additional baseline take annually.

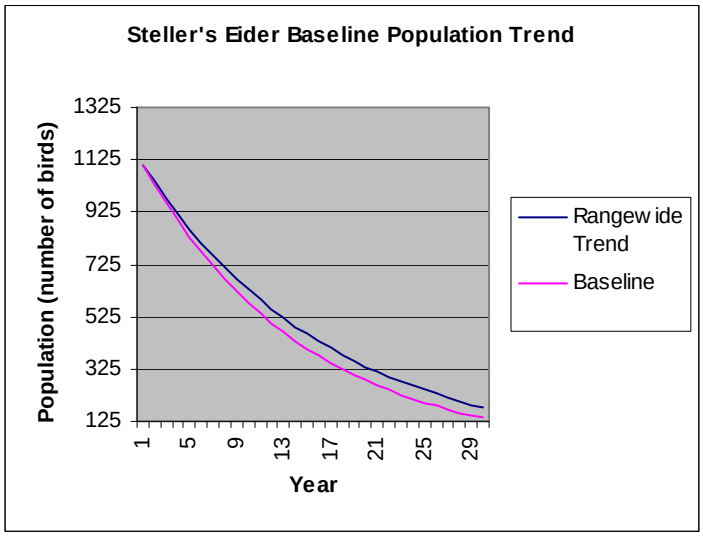


Table 5. Take of Steller's eiders anticipated from actions for which formal Section 7 consultation has been completed.

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
			Petroleum-sublethal	367	11
			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
			Strikes	1	24
Spring Subsistence	2003	annually	Lethal	7	17
Research		annually	Lethal	2	2

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

The probability of Steller's eiders being taken or harmed as a result of the construction of the mooring basin in Akutan Harbor is a function of many factors, including: temporal and spatial overlap of Steller's eider distribution with the area affected by disturbances associated with harbor construction and operation, the nature and duration of effects, and the frequency, intensity, and severity of disturbances.

Temporal and Spatial Overlap

At least 647 (Larned 2000) 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.

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 the dispersal of oil within the marine environment.

Steller's eiders are not present in the action area during the summer when construction of the proposed harbor is anticipated to occur. However, once completed, the new mooring basin will be operated while Steller's eiders are present (November through March). Although the new mooring basin is designed for vessels of the size class participating in the Bering Sea bottom fish fishery, which occurs during the winter, it is also expected to increase year round vessel traffic in Akutan Harbor.

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 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 new mooring basin.

Based on the criteria used to define Steller's eider winter habitat, the construction of the harbor is not anticipated to result in a direct and permanent loss of such habitat.

Evidence suggests that Steller's eiders exhibit high wintering site fidelity (Philip Martin, Service, pers. comm.; Paul Flint, USGS, pers. comm.). Eiders displaced from foraging habitat by disturbance may not be able to relocate to alternative foraging areas of sufficient quality if these areas are limited in availability.

According to Day and Pritchard (2000), operator error and equipment failure accounted for 49% and 34%, respectively, of all spills with known cause. Additionally, about 90% of all spills reported in the 1990s occurred at the three harbors involved in the Bering Sea bottomfish fisheries, including Akutan Harbor. The probability of accidental releases of petroleum will increase with each increase in number of vessels transiting the area. Thus, the accidental release of fuels into Akutan Harbor from vessels associated with the new mooring basin is anticipated to increase. Accidental petroleum releases can adversely affect the Steller's eider through either contamination of feathers, direct consumption of petroleum (e.g., during preening), contamination of food resources, or reduction in prey availability, and can result in reduced survivorship and subsequent population declines. Degradation of habitat due to chronic exposure to petroleum compounds may be difficult to quantify.

The potential for petroleum to adversely affect Steller's eiders represents a chronic event that is anticipated to exist for as long as the harbor is in operation (50-year project life). The accidental release of petroleum into the habitat of Steller's eiders may have both an immediate and lingering adverse effect. The oiling of a bird may result in sickness or death, depending on the degree of exposure. Petroleum products released into the marine environment can also have adverse effects that last from several months to several years. Anticipated adverse effects range from changes in prey abundance, distribution, and diversity, to the ingestion of chronic toxic levels of petroleum.

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. Data on vessel traffic levels and corresponding spill rates are not available; however, release of petroleum products into the marine environment via contaminated bilge water is believed to be a chronic source of contamination. We have limited information on Steller's eiders recovery rate. However, decreasing numbers range wide and poor overall productivity suggest this species may be highly sensitive to frequent disturbances.

The intensity of the disturbance is a function of the species' status both before and after the disturbance. Currently, limited information makes effects resulting from habitat degradation or physiological effects of chronic exposure to oil difficult to quantify and predict. Acute effects resulting from direct external contact with oil can be more easily estimated by the application of spill trajectory analysis and known eider distribution; predictions of these events may be based on historical data. The gregarious behavior of Steller's eiders may result in large numbers of birds being affected by relatively small spills.

The severity of the disturbance is a function of the species' recovery rate. Any disturbance event that affects the species' ability to recover through decreased reproductive potential would be considered severe. Not only do Steller's eiders show high fidelity for specific molting sites within lagoons (Flint et al. 2000), but preliminary evidence also suggests that Steller's eiders show high within season wintering site fidelity (Philip Martin, FWS, pers. comm., Paul Flint, USGS, pers. comm.). Such life history characteristics place Steller's eiders at increased risk of chronic and acute exposure to petroleum compounds where their wintering habitat and industrial developments overlap. Once oiled, feathers lose their water repellency, reducing the ability of eiders to maintain body heat. Immune defenses, survival and almost all aspects of reproduction may be affected by the ingestion of petroleum, either while preening or through consumption of contaminated food resources. Moreover, the availability of prey may be reduced by the introduction of petroleum products into the marine environment.

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 a mooring basin in Akutan Harbor include the increase in the number of vessels present in the action area on an annual basis. With this increase in harbor traffic comes an elevated risk of fuel spills resulting from operator error and equipment failure, as well as an increased risk of contamination resulting from release of petroleum-contaminated bilge water.

Direct Effects

Based on the criteria used to define Steller's eider winter habitat, the construction of the harbor is not anticipated to result in a direct and permanent loss of such habitat. Additionally, most harbor activities that could displace birds using nearby marine areas would be screened by the vegetated berm at the head of the bay; therefore, **no take is anticipated to occur due to displacement of birds from foraging habitat during the construction of the mooring basin.**

Indirect Effects

<u>Collisions with Lighted Vessels and Harbor-Related Structures</u>
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 wintering in close proximity to the proposed mooring basin and related facilities and to areas likely to be used by vessels seeking safe

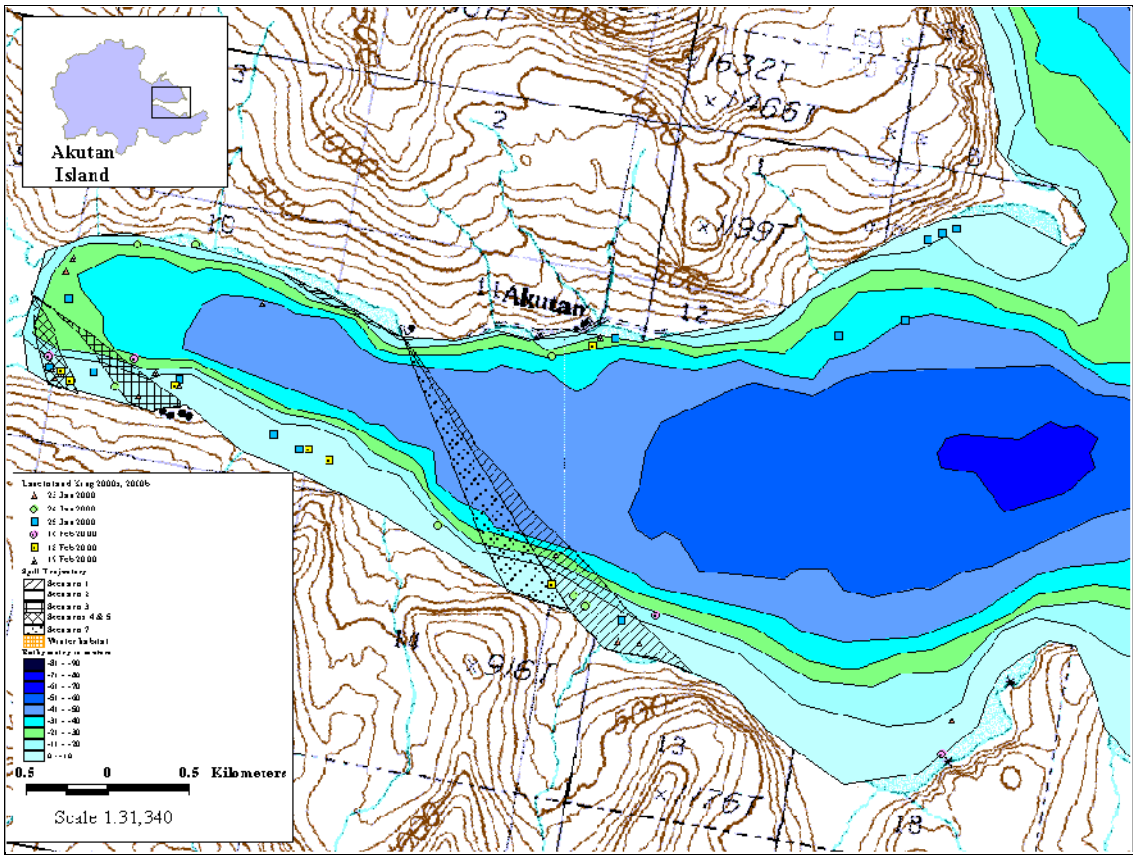
temporary moorage in the harbor are at increased risk of similar collisions. **It is estimated that one Steller's eider belonging to the listed Alaska breeding population will be injured or killed in this manner over the 50-year life of the project.**

Acute and Chronic Exposure to Petroleum Compounds

Due to anticipated increases in vessel traffic, particularly at the head of the harbor which heretofore has received little traffic and where the highest densities of Steller's eiders were recorded in January and February 2000 (Lanctot and King 2000a and 2000b), an increase in exposure, both acute and chronic, to petroleum compounds is anticipated to result. Additional contaminants which may be expected to be released into the marine environment as a result of the presence of these vessels include: copper from anti-fouling paints, sacrificial anodes on vessels and other protectively coated marine hardware, lead from boat batteries, engine exhaust products, cleaning agents, and grey water from holding tanks. It is known that petroleum 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). Moreover, Esler et al. (2000) found that during winter, harlequin duck survival was 5.7% lower in oiled areas compared to unoiled areas. We consider harlequin ducks, such as those studied by Esler et al. (2000) in Prince William Sound, to be suitable surrogate species for Steller's eiders due to similarities in size and life history traits. Furthermore, the periodic release of hydrocarbons, due to tidal and storm wave action, responsible for the 5.7% reduction in survivorship of harlequin ducks in oiled bays of Prince William Sound, may be comparable, in effect, to the periodic release of hydrocarbons from fishing vessels.

To determine specific areas most likely to be directly affected by fuel discharges and, thus, the minimum number of eiders at risk to spilled petroleum products, we modeled likely spill trajectories for seven spill scenarios representing both sudden bulk releases into the environment (due to equipment failure or operator error) and chronic discharges (due to contaminated bilge water), using the Akutan Spill Model (Pearce and Jones 2001). Results were consistent regardless of volume or type of discharge (Figure 6). Prevailing west-northwest winds drove fuel released at the Trident facility southeast, intersecting the southern shore at approximately 165°45'41" West. The same winds deposited fuel originating at the proposed mooring basin near South Creek at approximately 165°49'3" West. Northwest winds expanded the area affected by discharges from the mooring basin to approximately 165°48'11" West. Discharges from the Trident facility in east-southeast winds impacted shoreline between approximately 165°47'11" West and 165°48'1" West. Releases originating from the project site during east-southeast and due east wind conditions were driven ashore at the head of the harbor.

Figure 6. Predicted spill trajectories for seven spill scenarios, Akutan Harbor.



Based on this analysis, 505 Steller's eiders were determined to be at risk to spilled petroleum products originating at the new mooring basin and at the Trident facilities (Table 6). These estimates are based on distribution of Steller's eiders and their wintering habitat in Akutan Harbor and on predicted spill trajectories.

Table 6. Estimates of take anticipated to occur due to acute and chronic exposure to petroleum compounds as a result of the proposed action.

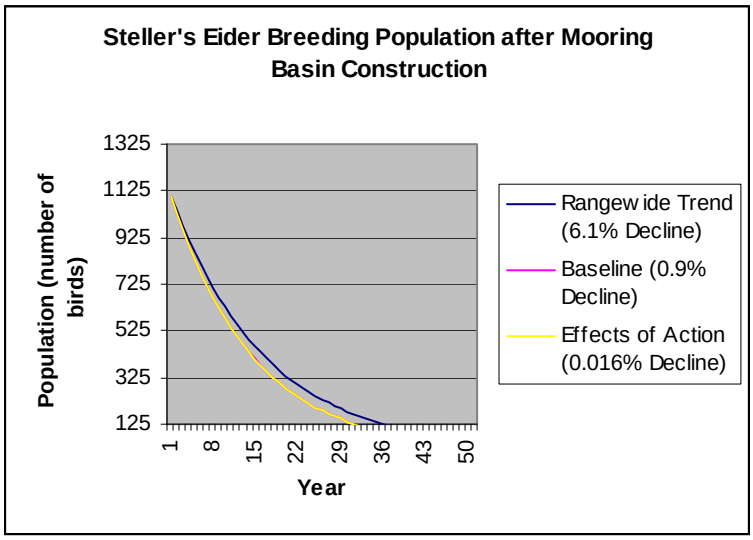
SCENARIO DESCRIPTION		HIGH COUNT WITHIN PREDICTED TRAJECTORY (Lanctot and King 2000a, 2000b)
1	Source: Trident Amount: 250 gallons Discharge type: Bulk Tide: Flood stage Wind: 20 knot northwest (315°)	175 (23 January 2000)
2	Source: Trident Amount: 250 gallons Discharge type: Bulk Tide: Flood stage Wind: 20 knot east-southeast (112°)	<1 bird
3	Source: New basin Amount: 25.5 gallons Discharge type: Continuous Tide: Ebb stage Wind: 20 knot northwest (315°)	175 (23 January 2000)
4	Source: New basin Amount: 250 gallons Discharge type: Continuous Tide: Ebb stage Wind: 20 knot northwest (315°)	153 (19 February 2000)
5	Source: New basin Amount: 25.5 gallons Discharge type: Continuous Tide: Ebb stage Wind: 20 knot west-northwest (337°)	153 (19 February 2000)
6	Source: New basin Amount: 250 gallons Discharge type: Continuous Tide: Flood stage Wind: 20 knot east-southeast (112°)	No trajectory into the harbor was produced
7	Source: Trident Amount: 250 gallons Discharge type: Bulk Tide: Ebb stage Wind: North-northwest (337°)	2 (18 February 2000)

To quantify effects of chronic oil exposure on Steller's eiders, we created a simple model using the following assumptions: 1) 4.2 percent of the Steller's eiders in the wintering population belong to the Alaska breeding population, 2) the breeding population is declining at the same rate as the overall population (6.1% annually), 3) reduced survivorship, due to chronic petroleum releases, occurs at a rate of 5.6% annually where

chronic releases occur, 4) the life of the project is 50 years, and 5) population growth rates (represented elsewhere by lambda) are equally sensitive to changes in the survival rates of juveniles and adults (Morrison and Pollock 2000, Morrison et al. 1998).

To model the potential effects of chronic oiling, we used 505 to represent the number of Steller's eiders in Akutan Harbor in year one of the model. We applied the population reduction factor of 5.7% for chronic oiling in an additive fashion to the assumed overall population decline of 6.1% annually (Appendix I). **Based on the calculations using these assumptions, we estimate approximately 9 Steller's eiders of the listed entity will be at risk of harm or death due to chronic exposure to petroleum as a result of this project.** This represents approximately 0.8% (9/1106) of the Alaska breeding population, and when amortized over the life of the project represents an additional 0.016% annual decline in the listed population. Based on this level of take, functional extinction of the Alaska breeding population is predicted to occur by year 30 as was predicted by the baseline model, and 2.5 years earlier than predicted by the range wide trend alone (Figure 7).

Figure 7. Steller's eider breeding population projection after construction of Akutan mooring basin.



<u>Displacement from Foraging Areas by Vessels Traversing the Harbor</u>

Lanctot and King (2000a and 2000b) 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. During January, they recorded 16, 21 and 25 large fishing boats during their survey periods, and in February they recorded 12, 15 and 17 vessels. In both cases, they indicated that interactions between these vessels and Steller's eiders were rarely observed as the larger vessels traveled predominantly via the middle of the harbor. When approached too closely (within 100 meters) by the survey boat (a 17 – 18 ft skiff), Steller's eiders typically responded by swimming then flying from the area. On one occasion in January, a large vessel approached to within 100 yards of a group of eiders that responded by swimming towards the head of the harbor although

remaining within 200 yards of the vessel. Based on this information, **we do not anticipate that Steller's eiders will be displaced from foraging habitat by increased vessel traffic within the harbor.**

Species' Response to Proposed Action

Numbers of Individuals in the Action Area Affected

Limited surveys indicated that at least 647 Steller's eiders use waters within the action area that is likely to be affected by the proposed project. Current winter population estimates do not include birds that occur here during spring and fall migration. Thus, it is unlikely that our limited observations represent the maximum number of eiders that use Akutan Harbor. Steller's eiders at Akutan Harbor represent 1.0% of the Alaska population of Steller's eiders. This value was derived by dividing the maximum number of birds seen within the action area that are believed to be from the Alaska population (647*0.042=27) by the most current population estimate for the Alaskan population of this species (2,543).

Sensitivity to Change

Steller's eiders' behavior changes with changing environmental conditions. They have been observed foraging in close proximity to human structures, including docks, and habitation. However, it has also been reported that they maintain a distance of at least 100 meters from humans themselves. We do not anticipate total abandonment of areas due to the physical presence of structures associated with the proposed project, but anticipate some level of disturbance due to the human activity associated with the proposed project.

Resilience

Little information exists regarding the resilience of this species to perturbations. The world population 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 et al. 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.

Recovery Rate

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 et al. 1995, D. Solovieva pers. com. 2000), the recovery rate for this species is believed to be quite slow.

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.

According to the biological assessment (USACOE 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, 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 to eiders 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 from foraging habitat.

CONCLUSION

This biological opinion assesses the effects of the construction of a new mooring basin at the head of Akutan Harbor on the Steller's eider. 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 the Steller's eider. 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.

Summary

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 in the hundreds or low thousands on the Arctic Coastal Plain, and possibly tens or hundreds on the Yukon-Kuskokwim Delta. Population size point estimates from aerial surveys from 1989 to 2002 indicate an average population size of 1,106. Smaller population sizes, averaging 168, are indicated by a second set of aerial surveys between 1992 and 2002. 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 et al. (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.

Take anticipated from other Federal actions which have recently undergone section 7 consultation is estimated to be 10 listed Steller's eiders per year, or 0.9% of the Alaska breeding population, and, when modeled, results in functional extinction by year 30, approximately 5 years prior to that predicted by a 6.1% annual decline alone.

Take as a result of the construction of a mooring basin at the head of Akutan Harbor is estimated to be 9 listed Steller's eiders due to chronic exposure to petroleum compounds. This represents 0.8% of the Alaska breeding population of Steller's eiders, and leads to functional extinction 5 years earlier than predicted by the range wide trend alone; this level of take does not appear to accelerate functional extinction over the baseline model.

Conclusion

After reviewing the current status of the Steller's eider, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Steller's eider, and is not likely to destroy or adversely modify designated critical habitat. This conclusion is based on the following factors.

Although long-term data indicate a 6.1% annual decline, several assumptions fundamental to this survey design are likely violated, thereby confounding interpretation of the data. Steller's eiders that begin migration early may have departed the spring survey area prior to commencement of the survey. This situation would violate the assumption that all of the Pacific wintering population is within the survey area during the survey. Furthermore, movements by satellite transmitter-tagged birds during the survey in 2002 suggest that major migrational shifts may occur during the spring survey, violating the assumption that all Steller's eiders remain stationary on staging areas during the survey period and are not missed or double counted. Finally, the tendency for observers to progressively underestimate the size of increasingly large flocks may actually result in an underestimate of the rate of eider decline (i.e., the number of birds in

large flocks were likely underestimated, but as birds become fewer and flocks become smaller, estimation of flock size may become more accurate; the rate of decline in this scenario would be less than what was actually occurring). For these reasons changes in Steller's eider numbers may not represent real population changes.

Trends in fall counts of Steller's eiders at Izembek Lagoon collected during Emperor goose surveys are contradictory to the spring migration counts (ABR 1998). While numbers of Steller's eiders observed during this survey declined from 1981 to 1991, they have shown an increasing trend since 1991. However, these data must be interpreted with caution. This survey was designed and is flown to maximize the number of emperor geese encountered. Recording the abundance of Steller's eiders is an ancillary objective of this survey. Thus, surveyors follow a flight route that maximizes the number of emperor goose that they see, attempting to arrive at emperor goose concentrations during high tides. Such flight paths and survey timing do not maximize the numbers of Steller's eiders encountered. Furthermore, it is possible that survey effort directed towards counting Steller's eiders changed over time as interest in this species increased (Robert Stehn, Migratory Bird Management, Anchorage, pers. comm. 2003). Surveys that result in population indices become problematic when effort changes over time. Thus, we acknowledge the existence of this data set that shows an increase in Steller's eider numbers at Izembek Lagoon over time, but choose to dismiss it as an indicator of overall population trend.

The breeding population of Steller's eiders in northern Alaska is estimated to number between the low hundreds to low thousands. However, the imprecision of our breeding ground estimates precludes us from detecting any but the most obvious population trends for the listed entity. Populations may be overestimated due to the periodic presence of local non-breeders in non-nesting years, or may be underestimated due to observer bias. Our understanding of Steller's eider productivity is limited to reproductive parameters estimated for the breeding population near Barrow, which may not be representative of Steller's eider breeding success throughout their range in Alaska.

Uncertainties surrounding population sizes and trends, and overall productivity undermine our ability to confidently detect appreciable changes in probability of recovery and survival due to the proposed action. Efforts to model the population based on current information resulted in times to functional extinction equal to that predicted by baseline conditions (5 years sooner than the range-wide trend). Therefore, we do not reasonably expect that the incremental increase in take of listed Steller's eiders resulting from this action will, directly or indirectly, reduce appreciably the likelihood of both survival and recovery of the species in the wild.

Uncertainties surrounding population sizes and trends, and overall productivity also undermine our ability to determine whether this listed entity is in jeopardy. Deficiencies in our information include: 1) a lack of information on the rate of immigration of individuals from the Russian breeding population to the Alaska breeding population; 2) projection of population decline based on the results of a (spring) survey that is not optimally designed to detect trends in this species; 3) use of a simple deterministic model

that does not take into account stochasticity or the tendency of Steller's eiders to breed intermittently; and 4) the assumption that subsistence harvest will remain constant through time. Within the framework of these limitations, our best available information suggests that the Alaska breeding Steller's eiders will undergo extirpation in approximately 30 years due to preexisting baseline conditions.

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 USACOE 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 USACOE has a continuing duty to regulate the activity covered by this incidental take statement. If the USACOE (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 USACOE 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

We anticipate that incidental take of Steller's eiders will be difficult to document because: 1) Steller's eiders exposed to petroleum levels that are not immediately lethal may not die near the location of contact; 3) Steller's eiders exposed to sub-lethal levels of petroleum will not exhibit readily apparent signs of toxicity; 4) impacts to prey abundance and distribution from released petroleum products will not be readily apparent; 5) the extent to which petroleum contamination can be attributed to the proposed action will be difficult or impossible to determine, and 6) the actual number of Steller's eiders belonging to the Alaska breeding population at this site is unknown.

The Service will not refer the incidental take of any migratory or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

Take Related to Acute and Chronic Exposure to Petroleum Compounds

The Service anticipates that petroleum releases will occur in association with the legal operation of the harbor due to operator error, equipment failure, sunken vessel, or contaminated bilge water discharges. This recognition by the Service is not intended to legitimize the otherwise illegal act of releasing petroleum into the environment. **We estimate that no more than nine Steller's eiders of the listed Alaska breeding population will be taken as a result of petroleum releases that occur within Akutan Harbor, including the proposed mooring basin itself.** This take is expected to be in the form of harm or direct lethal take.

Take Related to Collisions with Vessels or Structures

The Service expects that the operation of the harbor will result in harm or direct lethal take of birds striking harbor-related facilities, including vessels moored within the mooring basin or within Akutan Harbor. We anticipate that this take will be in association with the use of bright lights during poor weather. **We estimate that no more than one Steller's eider of the listed Alaska breeding population will be taken as a result of striking harbor-associated structures, including moored vessels.**

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 nine Steller's eiders belonging to the listed Alaska breeding population are harmed or killed as a result of petroleum releases that occur within Akutan Harbor, and these releases can reasonably be attributed to a vessel or vessels that would not be present in the area but for the presence of the mooring basin;
2. Greater than 204 Steller's eiders are harmed or killed as a result of petroleum releases that occur within Akutan Harbor, and these releases can reasonably be attributed to a vessel or vessels that would not be present in the area but for the presence of the mooring basin;
3. Greater than one Steller's eiders belonging to the listed Alaska breeding population are harmed or killed as a result of striking harbor-associated structures, including vessels moored within the mooring basin or Akutan Harbor;
4. Greater than 24 Steller's eiders are harmed or killed as a result of striking harbor-associated structures, including vessels moored within the mooring basin or Akutan Harbor.

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.

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 USACOE shall minimize impacts to Steller's eiders during construction of the harbor.
2. The USACOE shall minimize impacts to Steller's eiders during operation of the harbor.
3. The USACOE shall monitor impacts of harbor operation to Steller's eiders.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, USACOE 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 USACOE shall minimize impacts to Steller's eiders during construction of the harbor."
   1.1. The USACOE shall ensure that all construction activities that may harass Steller's eiders shall occur prior to the birds' arrival in the fall or after their departure in the spring. We estimate the arrival date to be November 15, but construction activities that may harass Steller's eiders shall cease as soon as eiders are observed in Akutan Harbor. We estimate the date of departure from the area to be March 30. However, upon concurrence of the Ecological Services Anchorage Field Office, construction activities may commence provided that no Steller's eiders have been observed within 2.4 nm of the construction site for 7 consecutive days after February 28. The USACOE shall immediately notify the Field Office of the presence of any Steller's eider that is observed from the project area during construction.
   1.2. The USACOE shall permanently install eyebolts into concrete or steel structures at appropriate locations at the outer and inner ends of the breakwater and any breaches for rapid attachment of spill containment booms.
   1.3. The USACOE shall ensure that the waters of the entrance channel are isolated from Akutan Harbor during dredging by installation of a silt curtain or similar material.

2. The following terms and conditions shall implement Reasonable and Prudent Measure No. 2: "The USACOE shall minimize impacts to Steller's eiders during operation of the harbor."
   2.1. In the Project Cooperation Agreement, the USACOE will require the local project sponsor to develop a Best Management Practice Plan (BMP) for the new mooring basin in cooperation with the City of Akutan. This plan should be based on the 1995 publication "BMP Examples for Alaska Compilation and Assessment for Harbor, Marina, Boat Operations, Repair and Maintenance" (Ross et al. 1995) (Appendix II), and should adapt pollution prevention strategies to meet conditions specific to Akutan Harbor. The Service will have the opportunity to review the draft BMP. In addition to Best Management Practices appropriate for Akutan Harbor, the following items shall be included in the BMP:
      2.1.1. The USACOE shall require the local project sponsor to provide receptacles for waste oil at the new mooring basin to reduce the amount of improperly disposed waste oil. The local project sponsor will maintain and empty these receptacles as long as vessels are using the harbor. Waste oil receptacles must be maintained so that they do not leak oil onto the surrounding substrate, and must be repaired or replaced within one month of the detection and reporting of any such leak. The local project sponsor will dispose of this waste oil according to ADEC standards.
      2.1.2. The local sponsor shall keep the shoreline between North Creek and longitude 165°43' West free of any wildlife entanglement (fishing nets, parts of traps and pots, monofilament lines, ropes, cords, etc.) and contamination hazards (batteries, zinc plates, engines, etc.). Any entanglement or contamination hazards that are removed should be disposed of according to ADEC standards.
      2.1.3. The local project sponsor shall consult with oil spill response experts to develop an oil spill response plan for the mooring basin. The Spill Response Plan shall be developed to prevent any spilled petroleum products from contaminating the areas where eiders were found to concentrate during the surveys conducted by LGL in January and February 2000 (Lanctot and King 2000a and 2000b) (Fig. 2). This Spill Response Plan shall:
         a. Determine the best method for containing and recovering oil spilled within the proposed mooring basin.
         b. Identify the type and number of equipment that is necessary to retain the oil within the harbor.
         c. Provide detailed instructions as to how the required equipment shall be deployed to keep the oil within the mooring basin, including appropriate locations for permanent boom anchor points and equipment staging areas.
         d. Identify who is the responsible party for implementing the Spill Response Plan and for maintaining spill response equipment in good working order.
         e. Provide detailed discussion of the specific primary, secondary and tertiary response measures, and their instructions for deployment, to be used to minimize effects to Steller's eiders and eider habitat in the event of a fuel spill. This discussion should refer to "The Best Practices for Migratory

Bird Care During Oil Spill Response" for accepted protocols. The Spill Response Plan should also identify any contractor to be bonded for wildlife rehabilitation if required by regulations. The selected contractor should have at a minimum a Federal Permit for Migratory Bird Rehabilitation and training as described in the Best Practices.

f. Identify vessels, within the harbor, that are capable of implementing the Spill Response Plan.
g. Provide necessary instructions to successfully implement the plan.
h. Be implemented no fewer than 45 days prior to construction of the new mooring basin.

2.1.4. At lease one qualified oil-spill response individual shall be present at Akutan Harbor during harbor operations.

2.1.5. The local project sponsor shall develop and enter into a contract with an oil spill response organization capable of implementing the Spill Response Plan in response to large (greater than 500 gallons) spills. This condition shall be implemented no later than September 1 of the year in which operation of the mooring basin commences.

2.1.6. The local project sponsor shall obtain all necessary equipment to implement this oil Spill Response Plan by September 1 of the year in which operation of the mooring basin commences. The local project sponsor shall ensure that the equipment needed to implement this Spill Response Plan is procured, readily available for deployment, and passes annual inspections by an oil spill response organization. The local project sponsor or their contractor is responsible for maintaining the equipment in good working order.

2.1.7. The oil spill response organization or a qualified individual at Akutan Harbor is responsible for coordinating and conducting annual oil spill response drills for spills that occur within the mooring basin.

2.1.8. The use of in-line bilge water filter systems for removing both dissolved and dispersed hydrocarbon contamination from bilge water will be encouraged.

2.1.9. The use of fuel collars during vessel fueling will be encouraged.

2.1.10. The local project sponsor will design, produce, and install two information signs. One sign shall be installed at the new mooring basin; the other shall be made available for installation at the Trident fueling facility. The signs shall address the effects of oil on the marine environment, background information on Steller's eiders, ways that the public can prevent and reduce fuel spills, and that discharge of oil is illegal. Design, content, text, and placement of the signs will be developed in cooperation with the U.S. Fish and Wildlife Service. The signs shall be completed and installed by September 1, of the year harbor construction is completed

2.2. Stationary lighting that is associated with the operation of the proposed mooring basin shall be shielded downward in such a way as to minimize the hazard of disorienting flying birds and causing them to strike fixed objects. The COE shall coordinate with the Service on the specifications for shielded lighting to be installed by the local sponsor.

2.3. The Corps of Engineers and project sponsors, Aleutians East Borough and City of Akutan, will participate as a working group member in the development of a Geographic Response Strategy for Akutan Harbor prior to the start of harbor construction.

3. The following Term and Conditions shall implement Reasonable and Prudent Measure No. 3: "The USACOE shall monitor impacts of harbor operation to Steller's eiders."
   3.1. The USACOE shall monitor the releases of petroleum at existing harbor facilities and at the proposed mooring basin. The USACOE shall coordinate with the U.S. Fish and Wildlife Service on the study design for this monitoring effort prior to its initiation. The Service and COE are currently developing applicable methods. Petroleum release monitoring shall occur pre-construction and post-construction in years 1 and 4 of harbor operation. A summary report shall be submitted to the Service annually. After these sampling periods, the monitoring terms will be re-evaluated by the Service and COE.
   3.2. The USACOE shall ensure that collisions of Steller's eiders with physical structures associated with the operation of the mooring basin (including, but not limited to associated power lines and poles, pilings, vessels moored in the harbor, and other structures present within and adjacent to the harbor that are associated with the operation of the harbor) are monitored.
      3.2.1. Eiders that have been injured or killed by colliding with harbor-related structures 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". Dead Steller's eiders shall be salvaged and kept frozen until they can be transferred to the Service.
      3.2.2. The local project sponsor shall pay for the expenses incurred in shipping and rehabilitating birds injured through collision with structures associated with the presence of the proposed mooring basin.
      3.2.3. The local project sponsor shall coordinate with the Service on the design and placement of notices urging the public to report dead or injured Steller's eiders. The local project sponsor shall cover the expenses associated with the printing and maintenance of these notices, and see that these notices are maintained in a readable manner throughout the year for the duration of the operation of the harbor, or until the Service no longer deems this measure necessary.
   3.3. The USACOE shall conduct pre-construction and post-construction surveys to monitor Steller's eider use of waters in the action area. These surveys should follow the survey design used by the LGL (Lanctot and King 2000a, 2000b). Pre-construction surveys shall be conducted once a month in November, December, January, February, and March during the winter prior to commencement of any construction activities. Post-construction surveys shall be conducted once a month in November, December, January, February, and March during the first two winters following construction of the proposed harbor. The COE may, alternatively, require the local project sponsor to fund a private consultant or the Service to conduct the surveys in the pre- and two post-

construction seasons. A summary report shall be submitted by the USACOE to the Service annually.

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.

1. Make Best Management Practices Plan available to harbor customers via the web (for example on the Akutan web page) or by some other means (i.e., hard copy).
2. Partner with the Service to secure funding for the procurement of equipment needed to implement the Akutan Harbor GRS. Equipment will be stored and maintained in Akutan Harbor.
3. Conduct an educational/outreach program in conjunction with the Service that includes:
   3.1. Holding an oil spill prevention education workshop for the fishermen using Akutan Harbor. The Service can provide contact information for workshop leaders.
   3.2. Designing and mailing a pamphlet to each tenant vessel owner in the proposed harbor regarding the effects of oil on waterfowl, ways that commercial fishing vessel operators can prevent and reduce fuel spills, and explaining that discharge of oil is illegal.
4. Conduct a clean-up of the beach areas between the Whaling Station and the Trident seafood plant to remove plastics, netting, tires, large pieces of scrap metal, rope, buckets, etc. and transport them to an approved landfill.
5. Facilitate the removal of a holding tank from the shoreline at the head of the bay.

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; or (4) 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. If the action agency is unable to fulfill the Terms and Conditions specified in the Incidental Take Statement of this Biological Opinion, consultation should be reinitiated.