

**Alaska-breeding population of Steller's eiders
(*Polysticta stelleri*)**

**5-Year Review:
Summary and Evaluation**

**U.S. Fish and Wildlife Service
Fairbanks Fish and Wildlife Field Office
Fairbanks, Alaska**

5-YEAR REVIEW

Alaska-breeding Steller's eiders/*Polysticta stelleri*

GENERAL INFORMATION

Methodology used to complete the review:

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a 5-year review is to assess each threatened species and endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. The U.S. Fish and Wildlife Service (Service) evaluated the biology and status of the Alaska-breeding population of Steller's eiders as part of a Species Status Assessment (SSA) to inform this 5-year review. The SSA report was written by biologists in the Fairbanks, Alaska field office who lead recovery efforts on the listed population. The SSA report represents our evaluation of the best available scientific information, including the resource needs and the current and future condition of the species. We developed future scenarios of environmental and management conditions to discuss the viability of the species in the future. One independent reviewer, and the Eider Recovery Team, which includes partner representatives and scientific experts, reviewed the SSA report before we used it as the scientific basis to inform our 5-year review recommendations.

Background and listing history:

Three breeding populations of Steller's eiders are recognized worldwide – two in Arctic Russia and one in Alaska. The Russian-Atlantic breeding population nests west of the Khatanga River in Siberia and winters in the Barents and Baltic Seas, the Russian-Pacific breeding population nests east of the Khatanga River and winters in the southern Bering Sea and northern Pacific Ocean. The Alaska-breeding population consists of two breeding subpopulations, referred to as the northern and western Alaska subpopulations, and mixes with the Russian-Pacific breeding population in the winter in southwestern Alaska.

Steller's eiders were petitioned for listing as Endangered range-wide in 1991 (56 FR 19073). In 1992, the USFWS deemed listing the species was warranted, but precluded due to other priority actions (57 FR 19852). During a status review in 1994, the USFWS determined that the species was not warranted for listing range-wide, but proposed that the Alaska-breeding population met the DPS policy and was warranted for listing as Threatened (59 FR 35896). The Final Rule for listing as threatened was published in 1997 (62 FR 31748). Critical habitat for Alaska-breeding Steller's eiders was designated in 2001 (66 FR 8850). A recovery plan was published in 2002 (68 FR 20020).

Since listing, the Steller's Eider Recovery Team has met regularly to discuss and prioritize recovery actions for the DPS. Recovery actions, conducted by USFWS and partners, have

included monitoring, research, outreach to reduce shooting, use of lead shot, and disturbance, and fox control near Utqiagvik. This is the first 5-year review for the listed population.

FR Notice citation announcing the species is under active review: 83 FR 141 142

REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) policy:

In the 1997 final rule for listing, the Alaska-breeding population was determined to have met the standards to qualify as a DPS, as outlined in the 1996 DPS policy. The population was considered discrete because it was physically separated from Russian-breeding populations by hundreds of kilometers across the Bering and Chukchi Seas. Second, the population was delimited by international boundaries, within which differences in conservation status existed. The population was considered significant because the loss of the Alaska-breeding population would represent a significant reduction in the species' breeding range worldwide. Additionally, the final rule identified another factor pertinent to the population segment's significance. Alaska is the only portion of the species' breeding range over which the United States government can exercise its authority to provide for the conservation of the species during nesting. Conservation of the Alaska-breeding population was predicted to increase in importance due to a concern about a possible range-wide decline of Steller's eiders.

Is there relevant new information for this species regarding the application of the DPS policy?

Research and monitoring has provided new information since the population's status was last reviewed in 1997; results are summarized in the SSA report. The following is our analysis of discreteness and significance given the available information.

The population still qualifies as discrete under both criteria, as it is still physically separated by the Chukchi Sea during the breeding season, and differences in the conservation status of Alaska- and Russia-breeding populations continue to exist. The Alaska-breeding population is significantly smaller than the Pacific-Russia and Atlantic-Russia breeding populations (Hodges and Eldridge 2001, p. 133; USFWS 2016, p. 8; Nygard et al. 1995, p. 144; Zydelis et al. 2006, p.222-225). The Alaska-breeding population also is afforded the Endangered Species Act and the Migratory Bird Treaty Act of the United States which enable more protections for Steller's eiders than under Russian laws.

In considering significance, policy directs us to consider the population's biological and ecological significance when determining the importance of the segment to the taxon to which it belongs. We considered the current status of the population segment and new scientific information relative to the significance standard which may include, but is not limited to, the four factors described in USFWS policy (identified below). We also considered other factors that

may influence the importance of the discrete population segment to the taxon, including its contribution to the “3 Rs” (resiliency, representation, and redundancy) of the taxon.

Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon. -- Given the available information, we do not consider the current range of the Alaska-breeding population, the Arctic Coastal Plain (ACP), a unique or unusual ecological setting. While the area surrounding Utqiagvik comprises a unique vegetation community relative to other parts of northern Alaska, that same vegetation type can be found within the breeding range of the Pacific-Russia breeding population of Steller’s eiders (e.g., the Lena and Indigirka river deltas; CAVM Team 2003). Polygonal tundra geomorphology, similar to that found in the Utqiagvik Triangle, is present within the range of Russia-breeding eiders as well (Solovieva 1999, p. 26-28; Pearce et al. 1998, p. 111).

Evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon. – This criterion concerns whether, considering the segment’s biological and ecological significance, the loss of the segment would result in a significant gap in the range of the taxon. In Russia, nesting Steller’s eiders are unevenly distributed in coastal tundra from the Yamal to the Chukchi Peninsulas, an area greater than 4,000 km in length (Fredrickson 2001). Based on observations from aerial surveys, the current range of Steller’s eiders in northern Alaska includes over 500 km of the coastal plain between Point Lay and Fish Creek, just west of the Colville River (USFWS, unpublished data). Despite its apparent disappearance from western Alaska, the species’ current range in Alaska continues to represent a sizable area. Therefore, the loss of the Alaska-breeding population would result in a significant gap in its range.

Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range. – The Alaska-breeding population is not the only surviving natural occurrence of the taxon; the species is widely distributed in its historical range in Arctic Russia.

Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. – Pearce et al. (2005) analyzed nuclear microsatellite DNA loci and cytochrome b mitochondrial DNA (mtDNA) from tissue samples collected from Steller’s eiders across their range to explore levels of genetic population differentiation. Significant patterns of differentiation between Russia and Alaska breeding areas were not detected using a suite of analyses of nuclear DNA markers. Comparisons of male and female mtDNA haplotype variation among sampled areas suggests female philopatry, but levels were not significant enough to result in genetic differentiation between Russia- and Alaska-breeding populations. Pearce et al. (2005) suggested that there may have been insufficient time since Pleistocene deglaciation and colonization of the current breeding range for differentiation to develop (p. 754). Based on these results, we conclude that the Alaska-breeding population does not differ markedly from other populations of the species in its genetic characteristics.

Other. -- The 1997 Final Rule identified an additional factor pertinent to significance of the discrete population segment: Alaska remains the only portion of the species’ breeding range over which the United States government can exercise its authority to provide for the conservation of the species during nesting. This was important at the time of listing because biologists believed

that the species was declining range-wide, and they believed that the importance of conserving the species in Alaska would increase over time.

The first statement remains true: Alaska is still the only location where the U.S. government can provide for conservation during nesting. However, the second half of the factor requires two assumptions: 1) the taxon is declining range-wide; and, 2) the conservation of the Alaska-breeding population would improve the viability of the taxon as a whole. We considered whether we have any new information to test these assumptions. First, while the Pacific-Russia breeding population may be declining, we have no scientific data to support or refute this claim, despite repeated attempts to survey molting and staging areas in southwest Alaska since listing (See Section 6.2.3 of the SSA report); therefore, the validity of the first assumption is unknown.

Second, we considered the population's contribution to the taxon's viability in the context of the 3 R's. Resiliency, or the ability of a population to withstand stochastic variation, is measured by population abundance or trend. The global population of Steller's eiders, which includes the Russia-Atlantic, Russia-Pacific, and Alaska-breeding populations, is estimated at 130,000-150,000 individuals (Bird Life International 2018). Only hundreds of Steller's eiders are estimated to be present annually on the Alaska breeding area. Given its low numbers, it is unlikely that the Alaska-breeding population contributes significantly to the overall taxon's resiliency. Interestingly, the Alaska-breeding population's future contribution to resiliency of the taxon is dependent on both the population sizes and trajectories of the taxon as a whole and the Alaska-breeding population. For example, if the taxon is stable or increasing, but the Alaska-breeding population decreases in numbers, the Alaska-breeding population will be less important to the resiliency of the taxon. Conversely, if the opposite is true it becomes more important. Representation is a population's ability to adapt to environmental change. It is unknown whether the adaptive capacity of Alaska-breeding birds differs from that of the Russia-breeding populations. Redundancy is the ability to withstand catastrophic events, and is typically measured by the number of resilient populations in the species and their distribution. Currently, the resiliency of the Alaska breeding population is considered low given the small number of individuals and current and future threats facing the population (see SSA for full analysis). However, the Alaska-breeding population does provide an additional, physically separate breeding population with a wide distribution in northern Alaska, thus its existence at least minimally increases the taxon's redundancy. Therefore, the Alaska-breeding population does not improve the range-wide taxon's resiliency significantly, provides a small increase in the taxon's redundancy, and it is unknown if it provides additional representation.

In summary, we concluded that the Alaska-breeding population of Steller's eiders continues to meet the standard for discreteness. It meets the significance standard primarily because a loss of the Alaska-breeding population would constitute a significant gap in the range of the taxon, and secondarily because of its importance to the conservation of the taxon. Given identified data gaps related to whether the population meets the significance standard, we recommend actions below that may help improve our ability to review the DPS designation in the future.

Status of the DPS

The status of the Alaska-breeding population has not been reviewed since listing in 1997. Long-term research and monitoring of the population has been conducted since prior to listing, results of which are summarized in the SSA report. We have new or updated information on numbers of Steller's eiders present annually in Alaska, parameter estimates of demographic rates, variability of those estimates, population genetics, and stressors. The information below is a synopsis of the SSA report; citations and further detail on each point can be found in the report.

Biology and current condition. -- The number of Steller's eiders present annually on the ACP (i.e., the northern Alaska subpopulation) is low (in the hundreds) and highly variable. Abundance and population trend are inestimable given the low numbers and level of inherent variability. Tundra and marine habitat conditions are influenced by highly variable environmental factors and ecological factors that seem to be changing. This is demonstrated in the high annual variability in reproductive rates such as breeding propensity and nest survival near Utqiagvik. Estimates of adult annual survival of Steller's eiders range from 0.75 to 0.86, and it is uncertain how these estimates relate to that of the entire northern Alaska subpopulation.

The degree of connectivity between the Pacific Russia-breeding and Alaska-breeding populations is subject of much debate among researchers and data on movement parameters are scarce. Mark-recapture analysis of nesting females and egg membranes suggests high philopatry and female breeding site fidelity of birds within the Utqiagvik study area (USFWS, unpublished data). This work also suggests that temporary emigration is high; in some years females do not return to nest, but it is unknown if their absence is because they forgo nesting that year, or nest in areas outside of the search area (in Alaska or Russia). Estimates of immigration, or the number of recruits entering the Alaska-breeding population from the Pacific-Russian population, are not available. Population modeling using aerial survey data suggest that the rates of immigration must be high in some years to result in the observed population indices (Dunham and Grand 2016); however, the ACP survey data are limited in their ability to describe abundance and trends of the northern Alaska subpopulation in part because observation error has not been estimated for Steller's eiders (other limitations to these data are described in Section 6.1.2. in the SSA).

Attempts at estimating the probability of extinction using population viability analysis (PVA), which is the basis for recovery criteria in the Steller's eider recovery plan (USFWS 2002), offer equivocal results (Runge 2004, Dunham and Grand 2017; C. Bradley, USFWS Biometrician, pers. comm.). Given the inadequacy of estimates of demographic parameters and population abundance, the probability of extinction is not estimable at this time.

Steller's eiders have not naturally re-colonized the Yukon-Kuskokwim Delta (Y-K Delta) in significant numbers despite increases in other nesting waterfowl in recent decades; thus, the western Alaska subpopulation is considered functionally extirpated. In addition, an evaluation of reintroduction to the Y-K Delta, including experimental reintroduction efforts, determined that it is not feasible at this time. The northern Alaska subpopulation has a relatively wide distribution on the ACP, but very low densities outside of Utqiagvik Triangle. The wide distribution during molt, winter and staging, assuming even distribution of Alaska-breeding birds with the Pacific-

Russia breeding birds, may provide some protection from a catastrophic event should one occur in a part of the non-breeding range. Overall, however, the Alaska-breeding population has low redundancy because only one subpopulation (the northern Alaska subpopulation) currently exists in Alaska.

The Alaska-breeding population historically occupied two ecological settings in the breeding season – Arctic and subarctic tundra. They are now restricted to the Arctic, and possibly prefer specific habitats near Utqiagvik. Variation in behavior or life history strategy may exist, but it has not been tested. Steller's eiders demonstrate some behavioral plasticity in their ability to respond to ice cover in winter by moving to deeper water, and consume a variety of marine invertebrate species. Population genetic analyses show no sign of lack of genetic diversity, which is likely maintained by male-mediated gene flow, but there are no data on genetic adaptive potential. Overall, the available data suggests that the population has moderate representation (i.e., the ability to adapt to environmental changes).

Threats analysis. -- In the SSA, we identified potential stressors (i.e., threats) that may affect the resiliency of the northern Alaska population of Steller's eiders in tundra habitat (breeding season) and marine habitat (molt, wintering and migration).

In tundra areas, we concluded that ingestion of lead shot (Factor E), shooting (Factor E), and collisions with power lines (Factor E) may have a high effect on the resiliency of the northern subpopulation of Steller's eiders because they directly affect adult survival and likely occur more often in areas with the highest density of nesting eiders (i.e., near the town of Utqiagvik). Human disturbance (Factor A), habitat loss near Utqiagvik (Factor A), avian and fox predation (Factor C), and changes to the lemming – avian predator system on the ACP (Factor E) moderately affect population resiliency as they likely reduce reproductive success and productivity of a significant portion of the northern subpopulation. Habitat loss due to oil and gas development in other parts of the ACP, such as eastern National Petroleum Reserve-A (NPR-A) and Prudhoe Bay (Factor A), has a low effect on subpopulation resiliency due to the very low density of Steller's eiders in those areas. We also identified that changes have already occurred to Steller's eiders tundra habitat due to climate change, and nesting goose populations on the ACP have increased in recent decades, but the effect of these changes to Steller's eiders and the subpopulation's resiliency is unknown.

In marine areas, harsh winter weather (Factor E) and predation by eagles or other predators (Factor C) may moderately influence resiliency through reduced survival and reproductive rates, while shooting (Factor E) may have a low effect on resiliency because it is unlikely given their remote distribution. We identified that changes in the marine environment (Factor E), exposure to fish processing waste in harbors (Factor E), human disturbance (Factor E), disease (Factor C), and contaminants other than lead (Factor E) may affect resiliency, but the magnitude of the effect of these stressors to the listed population is unknown at this time.

Assessment of future condition. – In the future, we predict that the current stressors will continue, and possibly increase in magnitude due to the changing arctic and subarctic climate and expanding infrastructure and resource development within the range of Alaska-breeding Steller's eiders. We predict that marine shipping activities will increase as shipping lanes open

up with sea ice loss, which will increase oil spill and collision risks; oil and gas development (both tundra and offshore) will increase; and, community infrastructure at Utqiagvik will continue to expand, increasing habitat loss, disturbance, collisions, and other stressors in Steller's eider breeding habitat in Alaska.

Given hypothetical but plausible scenarios of a range of management actions and predicted changes to habitat due to climate change, the resiliency of the northern Alaska subpopulation is likely to, at best, increase slightly or remain low. At worst, resiliency will decrease due to the effects of climate change and continuing stressors. We expect no increases in redundancy (currently low) or representation (currently moderate) under either scenario.

Summary. – The Alaska-breeding population consists of one extant subpopulation with low resiliency due to low numbers. The breeding range is wide, but concentrated near Utqiagvik, which is a human population center subject to significant anthropogenic factors and an area subject to rapid climate change predicted to affect Steller's eider breeding habitat. Redundancy is low. Representation of the breeding population is characterized as moderate due to their migratory nature, seemingly adequate genetic variation, and ability to feed on a variety of invertebrates. Research has shown high annual variability in reproductive parameters, likely due to breeding habitat conditions that are influenced by highly variable ecological processes, such as population cycles of lemmings and predators. Given hypothetical but plausible scenarios, we predicted that the resiliency of the northern Alaska subpopulation is likely to, at best, increase slightly or remain low. At worst, resiliency will decrease further due to the effects of climate change and continuing stressors. We expect no increases in redundancy or representation under either scenario.

Recovery Criteria

Recovery Plan. -- U.S. Fish and Wildlife Service. 2002. Steller's Eider Recovery Plan. Fairbanks Fish and Wildlife Field Office. Fairbanks, Alaska. 27p.

According to the Recovery Plan, in order to be considered for delisting, the Alaska-breeding population must have a $\leq 1\%$ probability of extinction in the next 100 years, and subpopulations in each of the northern and western subpopulations must have $\leq 10\%$ probability of extinction in 100 years and are stable or increasing. The probability of extinction of the population is not estimable at this time, given the best available scientific data (SSA report, Section 6.3). However, because only a small number of Steller's eiders are present annually in northern Alaska, and very few Steller's eiders have been observed nesting in western Alaska (SSA report, Section 6.1), we are confident that the Alaska-breeding population has not met the current recovery criteria related to probability of extinction.

In addition, Alaska-breeding Steller's eiders were listed due to a contraction in range rather than an understanding that one or more threats caused such a contraction. Because the extent to which potential or real threats caused the decline or impede recovery, establishing benchmarks for recovery measured against threats was considered impossible when the Recovery Plan was written. However, the plan stated that the following threats must be shown to not threaten or

endanger Alaska-breeding Steller's eiders for the population to be considered for delisting: 1) exposure to lead; 2) threats in the marine environment; 3) development and human presence in the Utqiagvik area; 4) viruses or other diseases; 5) predation; and, 6) hunting/shooting. These stressors still exist, and some, such as changes to the marine environment and development in the Utqiagvik area, have increased (SSA report, Section 6.4). Whether these stressors impact Steller's eiders at the population-level is not clear, but they likely continue to affect individual Steller's eiders. Thus, it appears that threats identified in the recovery plan have not been ameliorated.

In order to be reclassified from threatened to endangered under the current recovery plan, the population must have $> 20\%$ probability of extinction in the next 100 years for 3 consecutive years, or $> 20\%$ probability of extinction in the next 100 years and is decreasing in abundance. The probability of extinction of the Alaska-breeding population is not estimable at this time (SSA report, Section 6.3). However, based on the available information, the Alaska-breeding population of Steller's eiders does not meet the definition of endangered because, while it is difficult to estimate demographic rates and abundance of the population due to inherent variability, Steller's eiders have continued to return annually to the Utqiagvik Triangle. Additionally, the immediacy and urgency of identified stressors is not evident, and not reflected in the numbers of individuals that return to Alaska, or in the reproductive rates that have been estimated.

In summary, the Alaska-breeding population of Steller's eiders has not met recovery criteria for delisting in the Plan, and available information suggests it should not be reclassified from threatened to endangered.

Synthesis

The Service determined that the DPS meets the definition of threatened – in danger of extinction in the foreseeable future. Foreseeable future was defined as approximately 30 years, which equates to about three generations. The resiliency and redundancy of the population are low, making it vulnerable to environmental stochasticity and catastrophic events. While Steller's eiders may have some capacity to adapt to environmental changes, the identified stressors are likely to increasingly worsen over time, particularly near Utqiagvik where nesting Steller's eiders are most concentrated in Alaska. Global climate change is predicted to significantly affect the Arctic tundra and marine habitats of Steller's eiders. While there is considerable uncertainty in how habitat changes will translate to changes in demographic rates of Steller's eiders, the cumulative and/or synergistic effects of habitat change and current and future stressors are likely to negatively affect the small population to the point where it will be in danger of extirpation in the foreseeable future.

RESULTS

Recommended Classification:

- Downlist to Threatened**
- Uplist to Endangered**
 - Delist** (*Indicate reasons for delisting per 50 CFR 424.11*):
 - Extinction**
 - Recovery**
 - Original data for classification in error**
- No change is needed**

New Recovery Priority Number (*indicate if no change; see Appendix E*): 15

Brief Rationale:

The population's RPN is currently 3 based on the assessment that the population has a high degree of threat and that the category for subspecies is appropriate for a DPS (rather than species or monotypic genus categories). According to policy (48 FR 43104), the high category means extinction is almost certain in the immediate future because of a rapid population decline or habitat destruction. Given that we've determined that the DPS is threatened, extinction is not certain in the immediate future. We believe that assigning the population a low recovery potential is most appropriate, as the biological and ecological limiting factors and the threats to the population's existence are poorly understood. In addition, the management actions required for recovery remain unknown and have an uncertain probability of success. Therefore, we recommend that the RPN be changed to 15: Low degree of threat and low recovery potential for a subspecies, the closest taxonomy classification to a DPS.

RECOMMENDATIONS FOR FUTURE ACTIONS

The current demographic recovery criteria for the Alaska-breeding population of Steller's eiders are based on estimates of extinction probability using a PVA approach. Without precise estimates of relevant demographic rates, or an ability to estimate abundance of the Alaska-breeding population, the probability of extinction is not currently estimable. Abundance and demographic data are difficult to obtain because of the inherent variability in the species' life history characteristics, and the low numbers of Steller's eiders present annually in Alaska, not due to lack of funding or effort. Thus, we believe that demographic recovery criteria could be refined, or additional criteria could be added, to better enable the Service and others to measure success towards achieving recovery. Similarly, threats-based criteria could be refined to establish benchmarks from which to measure success at ameliorating threats. Therefore, we recommend that the Steller's Eider Recovery Team review the current criteria, determine if they can be improved, and provide specific suggestions on new criteria based on our current knowledge of Steller's eider ecology and threats.

In addition to considering revisions to recovery criteria, we recommend the following actions:

- 1) Gather information to improve the DPS evaluation in the future. For example, an assessment of habitat availability and current range of Steller's eiders in both Alaska and Russia could better inform the decision on whether the loss of the Alaska-breeding population would result in a significant gap in the range of the taxon.
- 2) Continue to improve survey methods and analysis to obtain estimates of abundance and trend of both the Alaska- and Pacific-Russian breeding populations.
- 3) Gather additional data on connectivity of Alaska- and Pacific-Russia breeding populations.
- 4) Continue to address threats that are of high concern in the Alaska-breeding range, such as ingestion of lead shot, power line collisions, shooting, and expansion of community infrastructure into Steller's eider nesting habitat.

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**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW
of the Alaska-breeding population of Steller's eiders**

Current Classification: Threatened

Recommendation resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: 15

REGIONAL OFFICE APPROVAL:

The Regional Director or the Assistant Regional Director, if authority has been delegated to the Assistant Regional Director, must sign all 5-year reviews.

Lead Regional Director, Fish and Wildlife Service

Approve May Colly Date 3/26/19

The Lead Region must ensure that other regions within the range of the species have been provided adequate opportunity to review and comment prior to the review's completion. Written concurrence from other regions is required.