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

5-Year Review:
Summary and Evaluation

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

5-YEAR REVIEW

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

GENERAL INFORMATION

Species: Eider, Steller's (AK Breeding DPS)
Date listed: June 11, 1997
FR citation(s): 62 FR 31748, 50 CFR 17.95(b)
Classification: Threatened

BACKGROUND

Most recent status review:

U.S. Fish and Wildlife Service. 2019. Alaska-breeding population of Steller's eiders (*Polysticta stelleri*) 5-year review: Summary and evaluation. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 15pp.

FR Notice citation announcing this status review:

89 FR 1125 1126, Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of the Aleutian Shield Fern and the Alaska Breeding Population of Steller's Eider, January 8, 2024

ASSESSMENT

Updated Recovery Criteria (USFWS 2021b):

***Recovery Plan.* --** U.S. Fish and Wildlife Service. 2021. Revised recovery plan for the Alaska-breeding population of Steller's eider *(Polysticta stelleri*). Northern Alaska Fish and Wildlife Field Office, Fairbanks, Alaska. 23 pp.

Since the last 5-year review, the Northern Alaska Fish and Wildlife Field Office revised the recovery criteria for the distinct population segment (DPS), the Alaska-breeding population of Steller's eider, in December 2021. The plan was developed in consultation with the Spectacled and Steller's Eider Recovery Team (Team), which consists of scientific experts and stakeholder representatives from the U.S. Fish and Wildlife Service (USFWS), other Federal agencies, the State of Alaska, academia, the North Slope Borough, and non-profit organizations. A subcommittee of the Team developed the specific metrics and thresholds for recovery criteria, with input from the entire Team, and a draft of this plan was reviewed by Team members.

As summarized in the recovery plan (USFWS 2021b, pp. 5–6),

> "The recovery plan revision was undertaken in response to the following two recommendations in the prior 5-year review. First, the demographic recovery criteria in the 2002 recovery plan were based on estimates of extinction probability generated from a population viability analysis, but given uncertainty pertaining to the interconnectedness of the Alaska-breeding and Russia-Pacific breeding populations, the ability to estimate extinction probability is limited. Thus, the Service recommended that demographic recovery criteria be refined, or additional criteria be added, to improve our ability to measure progress towards recovery. Second, the Service recommended re-evaluating the criterion in the 2002 recovery plan that requires viable breeding subpopulations in both northern and western Alaska. Since then, the criterion requiring a viable western Alaska subpopulation came into question. When the Alaska-breeding population was listed in 1997, biologists were increasingly concerned about the status of nesting waterfowl in western Alaska, specifically on the Y-K Delta, one of North America's most important waterfowl breeding areas. Spectacled eiders, a related species, had declined by 96 percent in the region, and Steller's eiders were hypothesized to have had followed a similar fate, albeit with little information about historical distribution and abundance in the region. Steller's eiders remain rare and have not re-colonized the region in any measurable way. Additionally, despite a rigorous analysis of reintroduction of Steller's eiders to the Y-K Delta, the Service found reintroduction to be an infeasible management tool due to high cost, low probability of success, and uncertainties related to habitat feasibility in a changing environment. At the same time, monitoring has demonstrated that a population of Alaska-breeding Steller's eiders has persisted in northern Alaska for several decades. Therefore, because we are confident that a population of Steller's eiders nested in northern Alaska historically, the revised recovery plan is primarily focused on ensuring a viable population in northern Alaska, rather than requiring subpopulations exist in other parts of Alaska where they may or may not have existed consistently in the past."

In addition, the new recovery plan incorporates the broader importance of the Pacific-wintering population to recovery of Alaska-breeding Steller's eiders. The revised recovery plan includes two alternative sets of recovery criteria:

1. A population size threshold for the Alaska-breeding population if we are confident that the Pacific-wintering population is stable or increasing; or
2. A higher population size threshold for the Alaska-breeding population if the current population trend of the Pacific-wintering population is unknown or declining

Meeting either of the above criteria is acceptable, and recovery of the Alaska-breeding population is not solely dependent on the status of the larger Pacific-wintering population. These general concepts were used to develop specific demographic metrics and thresholds for recovery criteria:

1. Over a long timeframe, the abundance of Steller's eiders in Alaska should be maintained or increase compared to that observed over the past 30 years,

2. Steller’s eiders should be distributed in the Utqiaġvik Ground survey area, and broadly across the Utqiaġvik Triangle and the Arctic Coastal Plain survey areas, or they should be present over a similarly wide distribution that includes areas of Alaska where they do not currently nest; and
3. If the population trend of the PWP is unknown, or is decreasing, the number of breeding Steller’s eiders in Alaska, and our confidence in that number, should be higher

In addition to the demographic recovery criteria, the recovery plan also includes threats-based criteria that should be met (USFWS 2021b, p. 17). Threats, including (but not limited to) ingestion of lead ammunition, mortality from shooting, bird collisions with structures, human disturbance in the breeding area, nest predation, and changes to the ecological community, must be found to not affect the ability of the population to meet and maintain the demographic criteria above.

More details on the specific recovery criteria thresholds can be found in the 2021 revised recovery plan for the Alaska-breeding population of Steller’s eiders (USFWS 2021b, p. 12–17).

Information acquired since the last status review:

This 5-year review was conducted by the USFWS Northern Alaska Fish and Wildlife Field Office. Data for this review were solicited from interested parties through a Federal Register notice announcing this review on January 8, 2024. We contacted State agencies, Federal agencies, tribes, local agencies, species experts, Universities, NGOs, partners, or stakeholders to request any data or information we should consider in our review, some of which include: USFWS Migratory Bird Management, USFWS Yukon Delta National Wildlife Refuge, Alaska Department of Fish and Game, North Slope Borough Wildlife Management, Alaska Migratory Birds Co-Management Council, Wildlife Conservation Society, Audubon Society, Defenders of Wildlife, Alaska Wildlife Conservation Center, Association of Village Council Presidents, Arctic Slope Regional Corporation, Olgoonik Corporation, and Calista Corporation. We received one public comment from the Center for Biological Diversity (pers. comm., 4 March 2024), and we included relevant scientific information from it into our review. Additionally, we conducted a literature search and a review of information in USFWS internal reports for new information. The previous 5-year review (USFWS 2019a, p. 3–10) remains an accurate assessment of the status of the Alaska-breeding population of Steller’s eiders, its biology, and the threats affecting it. In this review, we summarized new information pertaining to the Alaska-breeding population of Steller’s eiders. In the revised Species Status Assessment (SSA; USFWS 2025), we replaced Appendix A with improved population size and trend estimates of the Alaska-breeding Steller’s eider. As the revised recovery criteria incorporates the importance of the larger Pacific population (i.e., Pacific Russian-breeding Steller's eiders, Pacific-wintering Steller’s eiders; USFWS 2021b, p. 9), we added relevant information regarding the Pacific population in Appendix E of the revised SSA (USFWS 2025) to inform this status review.

Population size and trends

Pacific-wintering population of Steller's eiders

The condition of the Pacific-wintering population (PWP) of Steller's eiders is important for determining recovery of the listed population (USFWS 2021b, p. 9). At this time, the status and trend of the larger PWP is unknown; additional information on the larger PWP of Steller's eiders can be found in Appendix E of the revised SSA (USFWS 2025).

Alaska-breeding population of Steller's eiders

At present, the breeding distribution of the Alaska-breeding population of Steller's eiders spans the north-western coast of Alaska, with higher densities near Utqiaġvik; the western Alaska subpopulation is considered nearly extirpated (USFWS 2025, section 6.6). The number of Steller's eiders present on the Arctic Coastal Plain (ACP) annually is low and highly variable. There are three ongoing surveys that monitor the Alaska-breeding population of Steller's eiders: Utqiaġvik ground (UG) survey, Utqiaġvik Triangle (UT) survey, and Arctic Coastal Plain (ACP) survey.

The UG survey counts the number of breeding Steller's eiders prior to and during nest initiation and monitors nest fate. The UG survey started in 1999 and provides nearly 100% coverage of the ~170 km^2 study area around Utqiaġvik (USFWSa, 2021, p. 2, 5–6). The timing of the UG survey start is based on observations of Steller's eiders dispersing from newly thawed wetlands along the road system of Utqiaġvik after their initial arrival to the area in the spring (USFWS 2024, p. 5). Once the eiders have dispersed to tundra nesting sites, the UG survey is conducted by multiple observers searching the survey area on foot over 10–14 days. This survey provides an index count of breeding Steller's eiders by multiplying the number of males observed in the survey by 2 to account for paired, cryptic females (USFWS 2021b, p. 13; Table 1). There is considerable variation in the total number of breeding Steller's eiders across all UG survey years (Table 1). Due to the global coronavirus pandemic, the UG survey was not conducted in 2020 and 2021 (USFWS 2024, p. 23). The low numbers of eiders observed during early spring in 2020 and 2021, and low estimates of eiders observed from the UT survey in 2021 suggest that breeding effort was likely low in both years (USFWS 2024, p. 23; Table 2). During the most recent five years, 2023 had the lowest number of breeding Steller's eiders observed in the standard UG survey area since 2009 (Table 1). Since the previous 5-year status review (USFWS 2019b), the mean total number of Alaska-breeding Steller's eiders during the UG survey (excluding observations from the UT survey area) is 39.50 Steller's eiders (SD = 33.76; 2018–2023, no data for 2020–2021, 2024). The mean total number of Steller's eiders observed during the UG survey (excluding observations from the UT survey area) from the most recent 20 years (2005–2023, no data for 2020–2021, 2024) is 42.12 eiders (SD = 27.24).

The UT survey is an intensive aerial survey covering the area near Utqiaġvik where higher densities of Steller's eiders nest and has been conducted from 1999–2019 and 2021–2023 (Obritschkewitsch and Bankert 2024, p. 1). The UT survey provides a minimum population estimate for the surveyed area that does not account for imperfect detection. Based on 24 years of data from the UT survey area (1999–2023, no data for 2020), estimates have been highly variable for Steller's eiders (Obritschkewitsch and Bankert 2024, p. 11). Between 2019 and 2023 (no data for 2020), the estimated total numbers of Steller's eiders in the UT survey area ranged from 20 to 120 birds, without accounting for detection, (Obritschkewitsch and Bankert 2024, p. 8), and 2023 was the fourth-lowest estimate since 1999 (Table 2).

The ACP aerial survey has been conducted using consistent methods since 2007 (USFWS 2025, section 6.1.2) but has been conducted annually since 1986 and covers 90,000 km^2 of Alaska's ACP (Amundson et al. 2019, p. 2–3). The survey provides abundance indices for 20 species of breeding waterfowl and waterbirds (Amundson et al. 2019, p. 2), including Steller's eiders. Locations of recent observations (denoted by blue circles, 2019–2024) of Alaska-breeding Steller's eiders from the ACP survey are shown in Figure 1 (Swaim et al. 2023, USFWS unpublished data). These recent observations of Steller's eiders occurred in the UT survey area and near Teshekpuk Lake, similar to where eiders have been observed in the past across the ACP.

We estimated population size and trend of the Alaska-breeding population of Steller's eiders from the UT (1999–2023) and ACP (2007–2024) survey data using spatiotemporal generalized additive models and accounting for imperfect detection by observers (USFWS 2024/2025, Appendix A, p. 1–25). As the survey intensity within the UT area is much higher and consistent across space, population estimates derived from the models fit to the UT-only data are best used for inference to the UT area only. The 20-year mean number of Alaska-breeding Steller's eiders (2004–2023) within the UT area is 213.77 (95% CI: 111.15, 402.34). The highest density of Steller's eiders was in the northern section of the UT area, and the lowest density was in the southeast; through time, eider densities decreased in the southeastern portion of the UT area and increased in the north (USFWS 2025, Appendix A). As the ACP survey has lower transect coverage and fewer occurrences of Steller's eiders, a combined model integrating both UT and ACP data was found to be more precise than models using ACP data alone, and the integrated model improves on population inferences for Steller's eiders across the larger area (USFWS 2025, Appendix A). The combined model (using UT and ACP data) estimates the 20-year mean number (2005–2024) of Steller's eiders across the ACP, but outside the UT, is 151.65 eiders (95% CI: 59.19, 340.67).

The 20-year mean estimate of Alaska-breeding Steller's eiders across the entire Arctic Coastal Plain of Alaska (encompassing both UT and ACP areas) is 405.61 eiders (95% CI: 207.67, 750.02) (USFWS 2025, Appendix A). The temporal population trend fluctuates between short periods of increases and decreases, with an approximate 6.5 year period (USFWS 2025, Appendix A; Figure 2). Population trend posterior estimates show a strong increase over the most recent years and fluctuating trends as the time period increases (Figure 3). The posterior 10- and 25-year geometric mean growth rate was -0.03 (CI: -0.15, 0.06) and -0.02 (CI: -0.07, 0.02), respectively, with the shorter-term growth rate less well estimated. As the population appears to follow a cyclic pattern with a 6.5-year period, attention should be given to the start and end points for analyzing population trends, and similar phases in the cycle should be used (USFWS 2025, Appendix A). For example, the 3-period trend from 2003 to 2024 is 0.06 (CI: -0.01, 0.10) but the estimate is sensitive to the start year of this trend (2002, 2003, or 2004) because the population changes quickly (Figure 2). If instead the interval 2002 to 2022 is analyzed (three periods centered on the trough), the trend estimate is 0.02 (CI: -0.02, 0.06), and this is less sensitive to the exact choice of starting location, up to about plus or minus one year (USFWS 2025, Appendix A). Overall, the long-term population trend suggests an increasing or slightly decreasing population, depending on the time interval analyzed.

Since the previous 5-year review, Amundson et al. (2019) used 25 years (1992–2016) of aerial survey data collected on the ACP to estimate distribution, abundance, and spatially explicit population trend of several breeding waterbird species, including the Steller's eider. These estimates account for variation in the timing of the survey (before consistent survey methods were followed after 2007), but not imperfect detection by observers. The most current and relevant analysis of the Alaska-breeding population of Steller's eiders is described in Appendix A of the revised SSA (USFWS 2025). Amundson et al.'s (2019) modeling effort differs from the approach described in Appendix A (USFWS 2025), as it utilizes ACP survey data (only) for years 1992–2016, uses a full Bayesian simulation approach, and includes different covariates in their models. Similar to USFWS' (2024/2025, Appendix A) findings, densities of Steller's eiders were greatest near the coast; Amundson et al. (2019) found Steller's eider densities were highest in the National Petroleum Reserve of Alaska (NPR-A) (0.02/km^2; 95% CI: 0.01, 0.03) (Appendix 4: Table 2). Between 1992–2016, the average predicted abundance of Steller's eiders was approximately 100 eiders across the ACP area (Amundson et al. 2019, p. 9). The population trend (1992–2016) of breeding Steller's eiders in the NPR-A was 0.99 (95% CI: 0.92, 1.05; Amundson et al. 2019, Appendix 4: Table 2), corresponding to a relatively stable long-term growth rate on the log scale of -0.01 (95% CI: -0.09, 0.05), where the confidence interval potentially suggests either a declining or increasing trend.

In summary, while we have updated population estimates, the abundance and distribution of Alaska-breeding Steller's remains similar as described in our previous status assessment (USFWS 2019b, p. 36–37), and this information does not alter our understanding of the species' current distribution or abundance.

Table 1. Estimated total Steller's eiders (males and females) from the Utqiaġvik ground (UG) breeding pair survey (within the standard 134 km^2 survey area) and the estimated total Steller's eiders within the UG survey area but excluding observations that overlap with the Utqiaġvik Triangle (UT) survey area, 2005-2023 (no data for 2020-2021). The total number of eiders are estimated by multiplying the number of males observed during the UG survey by 2 to account for paired, cryptic females (USFWS 2021b, p. 13).

Year	Total eiders within the UG standard survey area	Total eiders within the UG survey area excluding the area of overlap with the UT survey area
2005	168	56
2006	108	36
2007	24	6
2008	210	58
2009	12	8
2010	34	14
2011	118	50
2012	110	48
2013	186	64
2014	238	94
2015	174	72
2016	52	28
2017	70	24
2018	156	84
2019	106	38
2020[a]	N/A	N/A
2021[a]	N/A	N/A
2022	66	34
2023	32	2

[8a] Surveys were not conducted in 2020 or 2021 due to the global coronavirus pandemic

Table 2. Indicated and estimated total numbers and estimated densities of Steller's eiders in the Utqiaġvik Triangle Study Area from aerial surveys, and Steller's eider pair densities and numbers of nests found during the USFWS ground study near Utqiaġvik, Alaska, 1999–2023 (From: Table 1, Obritschkewitsch and Bankert 2024, p. 8)

	Aerial Survey			Ground-based Study[a]		
Year	Indicated Total Non-flying[b]	Indicated Total Flying[b]	Estimated Total[c]	Density (birds/km^2)[d]	Pair Density (males/km^2)	Nests found
1999	72	40	224	0.08	0.98	36
2000	106	4	220	0.08	0.43	23
2001	22	22	88	0.03	0.16	0
2002	4	0	8	<0.01	0	0
2003	4	4	16	0.01	0.07	0
2004	8	4	24	0.01	0.07	0
2005	38	20	116	0.04	0.62	21
2006	34	14	96	0.03	0.40	16
2007	18	6	96	0.03	0.09	12
2008	48	0	96	0.03	0.78	28
2009	0	0	0	0	0.04	0
2010	2	6	32	0.01	0.13	2
2011	14	6	80	0.03	0.44	27
2012	56	18	156	0.06	0.41	19
2013	30	24	216	0.08	0.69	4
2014	32	28	240	0.09	0.89	50
2015	6	8	56	0.02	0.65	13
2016	6	0	24	0.01	0.19	12
2017	24	4	56	0.02	0.26	4
2018	16	12	56	0.02	0.58	13
2019	34	26	120	0.04	0.40	25
2020	N/A[e]	N/A[e]	N/A[e]	N/A[e]	N/A[e]	N/A[e]
2021	8	6	28	0.01	N/A[e]	N/A[e]
2022	8	10	36	0.01	0.38	6
2023	10	0	20	0.01	0.12	0

[a] USFWS ground-based study near Utqiaġvik (Graff 2021, N. Graff, USFWS, pers. comm.)

[b] Indicated Total (based on USFWS 1987) = (lone males × 2) + (flocked males × 2) + (pairs × 2) + (flocked birds × 1)

[c] Estimated Total = Indicated Total (non-flying plus flying)/survey coverage (survey coverage = 0.5 in 1999–2006, 2008, 2017– 2019, and 2021–2022; 0.25 in 2007, 2010, 2011, and 2013–2016; and a combination of 0.25 and 0.5 in 2009 and 2012)

[d] Density = Estimated Total/study area size

[e] Surveys were not conducted due to the global coronavirus pandemic

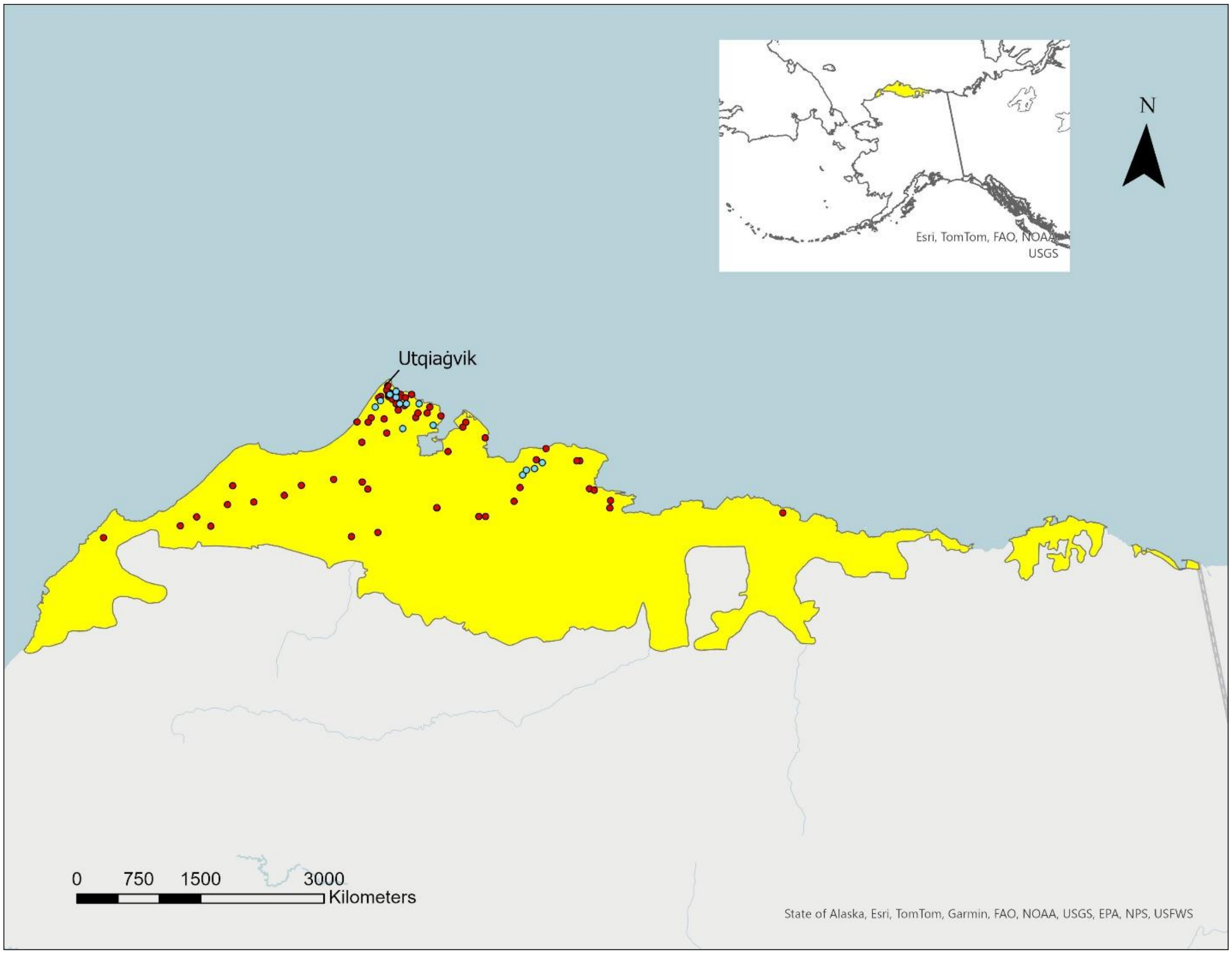

Figure 1. Observations of Steller's eider males, pairs, and flocks from the Arctic Coastal Plain (ACP) aerial survey in June 2007–2024 and Northern Eider (aerial) Survey in 1999–2006 (Swaim et al. 2023; USFWS unpublished data). Yellow area represents survey coverage on the ACP. Blue dots represent observations of Steller's eiders between 2019–2024 (n = 15 observations), and red dots represent observations of eiders between 1999–2017.

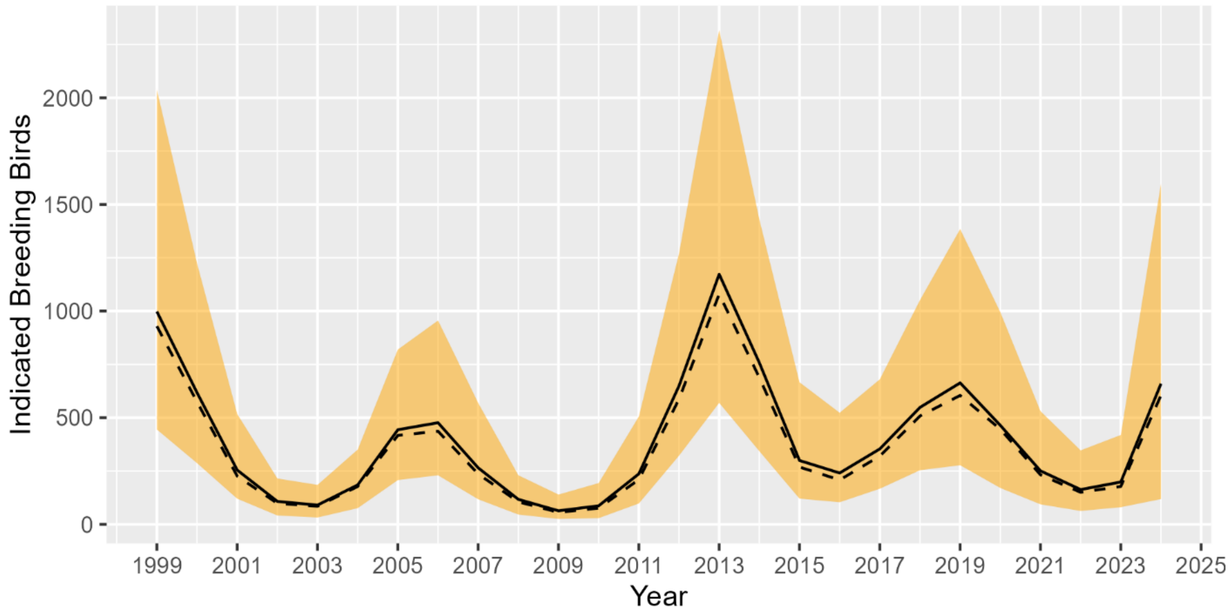

Figure 2. Posterior estimates of Alaska-breeding Steller's eiders across the whole Arctic Coastal Plain of Alaska from Arctic Coastal Plain and Triangle aerial survey data combined for model fitting after applying a detection correction. The black line is the posterior mean, the dashed black line is the posterior median, and the orange band is the 95% credible interval (From: USFWS 2025, Appendix A).

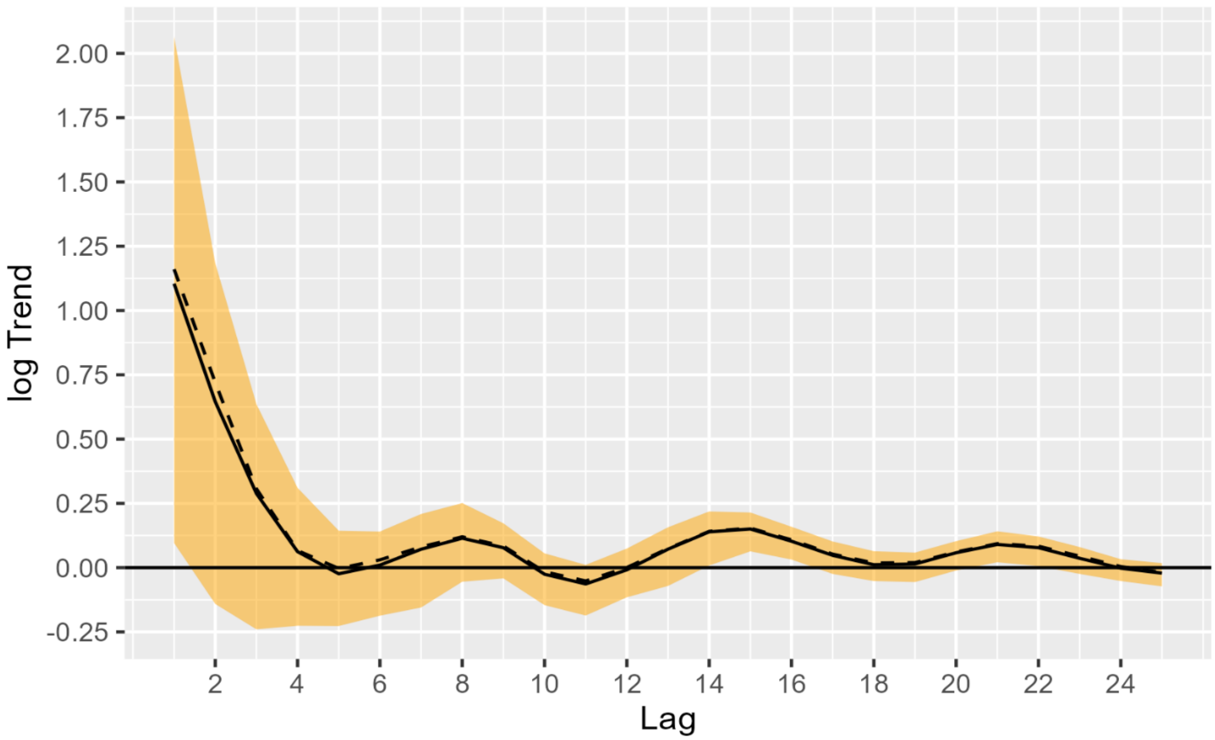

Figure 3. Posterior trend estimates of Alaska-breeding Steller's eiders across the whole Arctic Coastal Plain of Alaska from combined Arctic Coastal Plain and Triangle aerial survey data, 1999-2024. The y axis is the log of the geometric mean growth rate, and the x axis is the lag-year trend, i.e., for lag 10 gives the 10-year trend from 2014 to 2024. The black line is the posterior mean, the dashed black line is the posterior median, and the orange band is the 95% credible interval (From: USFWS 2025, Appendix A).

Breeding ecology

Foraging and tundra wetland use

Prior to this 5-year review, there was insufficient information on nutritional requirements and primary nutrient sources of Steller's eiders for understanding the relative importance of specific taxa in their diet, and there was limited contemporary information on the quality of available breeding habitat for breeding eiders.

Miller et al. (2022) found that Steller's eiders relied on foods from breeding area tundra wetlands for 95 percent of the protein needed to produce eggs (between arrival to breeding grounds and nest initiation), and 99 percent of the protein needed for incubation. For egg production, approximately 52 percent of the protein was derived from oligochaete-prey, followed by plant matter (32 percent) (Miller et al. 2022, p. 8). Steller's eiders likely ingest plant matter incidentally while accessing invertebrate prey on vegetation (Miller et al. 2023, p. 10). During incubation, the primary sources of protein were derived from insect larvae (31 percent), plants (26 percent), and crustaceans (25 percent) (Miller et al. 2022, p. 8). These percentages are estimates from a stable isotope mixing model (Miller et al. 2022, p. 5–8), so these values are not known with certainty; however, the authors concluded that their mixing model approach yielded reasonable results based on comparisons with gut content analyses from other breeding areas, with the caveat that some bias is present in the insect larvae and crustacean model estimates (p. 10). Since Steller's eiders rely on foods from tundra wetlands to produce and incubate their eggs, it is important to understand prey availability across the landscape and whether eiders prefer specific wetland types that reflect optimal foraging habitat.

Miller et al. (2023) characterized foraging behavior and use of different wetland types by pre-nesting Steller's eiders in Utqiaġvik, and Plesh et al. (2023) characterized prey availability in various wetland types around Utqiaġvik. Deep lakes have a greater surface area on the landscape within the Utqiaġvik study area; however, Steller's eiders preferentially used shallow ponds (*Arctophila* and *Carex*) and deep *Arctophila* ponds (Miller et al. 2023, p. 8). Occurrences of Steller's eiders were far lower in deep *Carex* ponds, deep lakes, and streams (Miller et al. 2023, p. 19). The authors suggest that *Arctophila*-dominated ponds may facilitate easier foraging by sea ducks because the pond bottoms beneath *Arctophila* stands include a layer of unconsolidated detritus from previous years, while *Carex* stands have dense root masses (Miller et al. 2023, p. 10–11). In addition, the submerged canopy of *Arctophila* may facilitate easier access to invertebrates (Miller et al. 2023, p. 10). Both shallow *Arctophila* and shallow *Carex* ponds had the highest total invertebrate biomass relative to the deeper ponds and lakes (Plesh et al. 2023, p. 12). While shallow wetlands are important wetland types for Steller's eiders, the availability of these shallow wetlands are declining and may continue to decline in the future (Plesh et al. 2023, p. 18–19).

Status and trends of nesting effort

The timing of nest initiation coincides with the timing of snowmelt in Utqiaġvik, which varies annually (USFWS 2024 p. 17). Since 2017 (no data for 2020–2021), the first snow-free date has occurred later than the long-term average, with exception of 2019 (USFWS 2024, p. 17). Snowmelt in 2022 was tied with 2010 for the latest snow-free day on record since the project began in 1991 (USFWS 2024, p. 17). While timing of snowmelt in relation to nesting effort for Steller's eiders has not been analyzed, later snowmelt and cold temperatures in the early breeding season may result in: 1) lower breeding propensity; 2) later nest initiation and hatch date; and/or, 3) lower body condition of females leading to nest abandonment (USFWS 2025, Appendix D).

Steller's eider nesting effort in Utqiaġvik varies considerably among years (Table 3). Since the previous 5-year review, nest surveys in Utqiaġvik have taken place in 2018, 2019, 2022, and 2023. Over these years, a mean of 11 (SE = 5.4) Steller's eider nests were found per year, similar to the long-term (1991–2023) mean of 14 (SE = 3.1) nests during years when nests were found. Over this period, no nests were found in 9 years (Table 3). The long-term mean nest survival (i.e., the probability that at least 1 egg hatches) is 0.29 (SE = 0.05) in years when nests were found, whereas mean nest survival over the recent years (2018, 2019, 2022) was 0.11 (SE = 0.09).

In Utqiaġvik, Steller's eiders nest in association with pomarine jaegers (*Stercorarius pomarinus)*, which have higher breeding effort in years with moderate to high brown lemming (*Lemmus trimucronatus*) abundance (Quakenbush and Suydam 1999, p. 36–38). In recent years of the UG survey (2018-2023, no data 2020-2021), brown lemming abundance has been low, and their distribution in the survey area has been patchy (USFWS 2021a p. 26, 2024, USFWS unpublished data). In recent years (2018–2023, no data 2020–2021), pomarine jaegers nested in low numbers, except in 2019 (Table 4), when they nested in moderately high numbers. In the same year, the highest number of Steller's eider nests were found in the UG area since 2014 (Table 4), and Steller's eider nest density was higher within territories of pomarine jaegers (USFWS 2021a, p. 27; USFWS 2024, p. 22, 24).

In summary, Steller's eiders continue to have annually variable nesting effort in the UG area, with an apparent nesting association with pomarine jaegers, and they continue to have low nest survival as described in the previous 5-year review; therefore, the additional information does not change our overall understanding of their nesting ecology.

Table 3. Steller's eider nest survival near Utqiaġvik, 1991–2023. From: USFWS 2024.

Year	Nests found	Nests hatched	Apparent nest success (%)	Found viable	Number failed	Mayfield [a] nest survival	Lower 95% CI[b]	Upper 95% CI
1991	6	5	83	6	1	0.72	0.10	0.96
1992	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1993	20	4	20	13	9	0.21	0.05	0.46
1994	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1995	78	8	10	25	17	0.19	0.06	0.38
1996	22	6	27	11	5	0.53	0.14	0.82
1997	4	0	0	3	3	0.00	N/A	N/A
1998	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1999	36	7	19	27	20	0.10	0.03	0.23
2000	21[c]	4	19	17	11[c]	0.14[d]	0.03	0.35
2001–2004	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2005[e]	21	6	29	15	9	0.31[d]	0.07	0.62
2006[e]	16	15	94	16	1	0.88	0.67	1.00
2007[e]	12	7	58	12	5	0.47	0.23	0.92
2008[e]	28	19	68	27	8	0.62[d]	0.32	0.77
2009[e]	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2010[e]	2	1	50	2	1	0.29	0.00	0.84
2011[e]	27	14	52	22	8	0.50	0.21	0.73
2012[e]	19	9	47	12	4	0.36	0.07	0.68
2013[e]	4	0	0	2	2	0.00	N/A	N/A
2014[e]	50	8	16	24	17	0.14	0.04	0.30
2015[e]	13	6	46	7	4	0.12	0.00	0.46
2016[e]	12	6	50	9	4	0.36	0.07	0.68
2017	4	0	0	1	1	0.00	N/A	N/A
2018	13	0	0	5	5	0.00	N/A	N/A
2019	25	10	40	16	8	0.28	0.07	0.55
2020[f]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2021[f]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2022	6	1	17	4	3	0.06	0.00	0.52
2023	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[a]Mayfield (1961, 1975)
[b]Johnson (1979)
[c]Excludes two nests that failed as a result of research activities
[d]Includes pre-failure exposure intervals on any nest that was known to fail due to observer activities
[e]Fox control occurred in study area.
[f]No ground surveys were conducted in 2020 or 2021

Table 4. Nesting by Steller's eiders and avian predators near Utqiaġvik, 1991–2023. From: USFWS 2024 and USFWS unpublished data.

Year	Steller's eiders present past 15 June	Nesting by			Steller's eider nests[a]		
		Steller's eiders	Snowy owls (number of nests)[b]	Pomarine jaegers (number of nests)[h]	Found viable	Found post-failure	Total found
1991	Yes	Yes	Yes (33)	Yes	6	0	6[c]
1992	No	No	No (0)	No	0	0	0
1993	Yes	Yes	Yes (20)	Yes	13	7	20
1994	Yes	No	No (0)	No	0	0	0
1995	Yes	Yes	Yes (54)	Yes	25	53	78
1996	Yes	Yes	Yes (19)	Yes	12	10	22
1997	Yes	Yes[d]	No (0)	No	3	1	4
1998	No	No	No (0)	No	0	0	0
1999	Yes	Yes	Yes (26)	Yes	27	9	36
2000	Yes	Yes	Yes (17)	Yes	17	6	23
2001	Yes	No	No (0)	No	0	0	0
2002	Yes[e]	No	Yes (4)	No	0	0	0
2003	Yes[f]	No	Yes (6)	Yes[g]	0	0	0
2004	Yes	No	No (0)	No	0	0	0
2005	Yes	Yes	Yes (4)	Yes	16	5	21
2006	Yes	Yes	Yes (35)	Yes	16	0	16
2007	Yes	Yes	No (0)	Yes	12	0	12
2008	Yes	Yes	Yes (31)	Yes	27	1	28
2009	Yes	No	No (0)	No	0	0	0
2010	Yes	Yes	No (0)	No	2	0	2
2011	Yes	Yes	Yes (3)	Yes	22	5	27
2012	Yes	Yes	Yes (7)	Yes	12	6	19
2013	Yes	Yes	No (0)	No	2	2	4
2014	Yes	Yes	Yes (22)	Yes	24	25	50
2015	Yes	Yes	Yes (3)	Yes	7	3	13
2016	Yes	Yes	Yes (4)	Yes	9	2	12
2017	Yes	Yes	No (0)	No	1	3	4
2018	Yes	Yes	Yes (5)	Yes (4)[h]	5	8	13
2019	Yes	Yes	Yes (4)	Yes (43)[h]	16	7	25
2020[i]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2021[i]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2022	Yes	Yes	Yes (2)	Yes (12)[h]	4	2	6
2023	Yes	No	No (0)	Yes (11)[h]	0	0	0

[a]Number of nests found are not comparable among years due to inconsistent search effort.
[b]Data on number of owl nests from Owl Research Institute surveys (213 km^2 that encompasses the Steller's eider ground-based survey area) in the Barrow area (Petersen and Holt 1999; Denver Holt, Owl Research Institute, personal communication).
[c]Much lower search effort than in other years.
[d]Very few Steller's eider nests were found despite considerable search effort.
[e]One pair was observed on 17 June at a site not visited in earlier years. Otherwise, none seen after 7 June.

[f]One pair observed on 19 June in a large stream. No other birds were observed after 14 June.
[g]Only one Pomarine Jaeger nest found during the survey, which was abandoned later in the season.
[h]Nest search effort for pomarine jaegers is variable each year.
[i]Nest surveys were not conducted in 2020 or 2021 due to the global coronavirus pandemic.

Nest site selection

Miller (2023) compared habitat characteristics around nests of Steller's eiders, spectacled eiders, king eiders, and long-tailed ducks to assess site selection among years from 1992–2022 at different spatial scales. The author used input data composed of seven categories of variables: fixed effects, anthropogenic activity, physical terrain features, landcover and landforms, water, vegetation, and two social categories (coloniality and predatory protection) (p. 106–113). The fixed effects used in all models included latitude, longitude, and year.

Miller (2023) found that 85.2 percent of the study area had low habitat suitability for Steller's eiders in a given year (p. 133–134). There was high spatiotemporal variation in suitable habitat among years, but the total amount of suitable habitat was similar across all years (p. 119). Among all categories analyzed, social clustering variables were the most important criteria for delineating suitable nesting habitat. For Steller's eiders, which exhibit high interannual variability in breeding effort unlike other species of sea ducks, the year of sampling was also highly important in defining suitable habitat. Some of the most influential variables delineating suitable nesting habitat for Steller's eiders were distance to nearest Steller's eider sighting, distance to nearest duck of any species, year, and distance to nearest pomarine jaeger (Miller 2023, p. 136, 141). Suitable habitat for Steller's eiders was informed in part by terrain features and soil moisture at the 30-, 500-, 1000-, and 2,750-meter (m) scales (Miller 2023, p. 136). Trends indicated that geophysical features are less important in defining suitable habitat for Steller's eiders than are social clustering variables (Miller 2023, p. 136-139) and that these patterns vary interannually.

While anthropogenic variables did not highly impact suitability of nesting habitat in the models, anthropogenic effects were not trivial (Miller 2023, p. 151). Of all anthropogenic variables, distance to road was the single most influential variable across species and spatial scales, although proportion of developed area was important for Steller's (and spectacled) eiders at broad spatial scales (1000 m and 2750 m) (p. 141). Areas closer to Utqiaġvik were found to be highly suitable nesting habitat for Steller's eiders, in which they may prefer the higher relief areas that are ideal for constructing buildings. In recent years, development of a new gravel pit occurred in previously suitable habitat for Steller's eiders. It is important to mitigate loss of these highly suitable habitats, as most of the study area represented low suitability as nesting habitat for all sea duck species (Miller 2023, p. 152).

Critical Habitat

In 2004, the USFWS designated 5 critical habitats for the Alaska-breeding population of Steller's eiders-a breeding habitat unit on the Yukon-Kuskokwim Delta, and 4 units in the marine waters of the Kuskokwim Shoals, the Seal Islands, Nelson Lagoon, and Izembek Lagoon (66 FR 8850 8884). Maliguine (2024) assessed the availability of benthic prey for molting Steller's eiders at Izembek Lagoon, comparing 2018–2019 benthic samples to samples collected by the U.S. Geological Survey in 1998. In 2019, Maliguine (2024) found significantly less bivalve and crustacean biomass available for molting eiders, and the size of bivalves and gastropods were significantly smaller in 2019 compared to 1998 (p. 9–10). The author suggested that the prey availability at Izembek Lagoon may not be optimal for molting Steller's eiders, as previous work suggested that molting eiders foraged on more bivalves during molt than pre- and post-molting eiders (Petersen 1981, p. 199–200; Troy and Johnson 1987, p. 358, 437; Metzner 1993, p. 85, 87), and foraged on larger bivalves than what was commonly available during the molt period (Petersen 1980, p. 104). During the molt, Steller's eiders are flightless for about a month, requiring shallow molting sites with abundant, high-quality, and accessible prey to forage on for feather regrowth, and are limited to the available prey at the molting sites. The reduced biomass and size of bivalves, which may be an important source of protein for molting Steller's eiders, could help explain the lower numbers of Steller's eiders at Izembek Lagoon during the remigial molt period in recent years relative to other areas that are characterized by large mussel beds (i.e. Nelson Lagoon). Eiders may consequently face lowered body condition or survival, or they may redistribute to other molting areas with higher benthic biomass in response to changes in benthic prey at Izembek Lagoon (Maliguine 2024, p. 11).

The eelgrass bed community has been identified as an important marine habitat factor for Steller's eiders, and several of the critical habitats (e.g., Izembek Lagoon, Nelson Lagoon) have eelgrass beds. The U.S. Geological Survey has a long-term monitoring program of the eelgrass beds at Izembek Lagoon, which represent the largest continuous beds on the Pacific coast. Between 2006 and 2020, a net loss of 25 km^2 of eelgrass habitat was estimated from satellite imagery and about 125 km^2 of eelgrass habitat was unchanged (Douglas et al. 2024, p. 13–14). While the cumulative total biomass of eelgrass at Izembek Lagoon has been relatively stable through time (Douglas et al. 2024, p. 13–14; Ward and Amundson 2019, p. 7; Ward et al. 1997, p. 237–238), the associated benthic invertebrate community may be less stable (Maliguine 2024).

Currently, we have a limited understanding of the status of marine habitats used by Steller's eiders, as habitat assessments have only been conducted at Izembek Lagoon. Benthic surveys at Nelson Lagoon to evaluate the foraging conditions for molting Steller's eiders have been proposed (J. Schamber, Alaska Dept. of Fish and Game, pers. comm.). Recent observations at Nelson Lagoon suggest drastic changes in barrier island morphology are occurring (see *Threats: Extreme weather and marine habitat changes*). It may be important to assess molting habitats across a large spatial scale if Steller's eider molt distribution is changing or their survival during molt has decreased due to changes in foraging conditions in nearshore marine habitats.

Threats

The SSA identifies stressors that may contribute to the current condition of the northern Alaska subpopulation of Steller's eiders (USFWS 2025, section 6.4.1). Stressors were evaluated based on a cause-and-effect analysis (USFWS 2025, Appendix D). The tundra-specific (breeding) stressors are shooting, human disturbance, habitat loss near Utqiaġvik, oil and gas development, habitat change due to climate change, avian and fox predation, changes to lemming population cycles, harsh spring weather and late snow melt, increasing nesting goose populations, and collisions. Marine (non-breeding) stressors include changing marine conditions in the North Pacific and Bering Sea, harsh weather, shooting, predation, fish processing, contaminants (non-lead), disease, parasites and biotoxins, and disturbance. In addition, increased vessel traffic was identified as a new stressor, as it increases the risk of collisions between Steller's eiders and marine vessels (USFWS 2025, section 7.2). The level of concern for habitat loss near Utqiaġvik, oil and gas development on the Arctic Coastal Plain, habitat change, increasing goose populations, and marine stressors are largely unknown. While we have little new information on several of these threats, many threats are assumed to continue range wide and have effects on the population demographics. Below are descriptions of the current status of some threats from recent years.

Nest predation

Nest depredation is the primary reason for nest failure among Steller's eider nests found in the UG survey area. Nest depredation rates have been high in recent years (ranging 64–100 percent), and the mean proportion of depredated nests is approximately 77 percent between 2017 and 2023 (no data for 2020–2021, no nests found in 2023; USFWS unpublished data).

Collisions

Steller's eiders may collide with man-made structures, power lines, and marine vessels, causing injury or death. Since 2019, there were no records of Steller's eiders found dead or injured near power lines from the UG survey efforts; however, there were several injuries and mortalities of other sea ducks (e.g., long-tailed ducks, spectacled eiders, and king eiders) that were presumed to have resulted from power line strikes in Utqiaġvik in the last 5 years (USFWS unpublished data); therefore, the threat of power line collisions remains.

In addition, Steller's eiders could collide with marine vessels traveling in shallow habitats along the coast of the Alaska Peninsula and Aleutian Islands. In March 2020, the National Marine Fisheries Service reported a mortality of a Steller's eider by a vessel in the trawl groundfish fishery of the Bering Sea/Aleutian Islands Management Area (BSAI) (NOAA Fisheries 2020). The vessel strike occurred at night while the vessel was in transit (i.e., not during fishing activities) near Cape Krenitzin, just north of False Pass in the NMFS reporting area 509. While previous collisions with Steller's eiders have occurred and been reported via the North Pacific Observer Program (Labunski et al. 2022), this instance was the first recorded take of an Alaska-breeding Steller's eider by any fisheries operating in the BSAI or Gulf of Alaska Management

Area (NOAA Fisheries 2020). Federally managed commercial groundfish fisheries off Alaska, including vessels 40 feet length overall and larger, and the commercial halibut fishery are subject to the North Pacific Observer Program requirements, except for catcher vessels delivering unsorted codends to a mothership. Vessel traffic density is high along the coast of the Alaska Peninsula and Aleutian Islands (Silber et al. 2021, p. 182–183), in the known non-breeding range of Steller's eiders. It is possible that more vessel strike collisions occur from other fishing and non-fishing vessels (e.g., military, cargo, or tanker vessels) and may not be reported; therefore, the extent of this threat is largely unknown.

<u>Contaminants</u>

Contaminants have been identified as a stressor that may contribute to the current condition of the Alaska-breeding population (USFWS 2019b, p. 49). In summer of 2024, an unknown release of oil was identified in a tundra lake that drains into Avak Creek, near Utqiaġvik, where the highest concentrations of Alaska-breeding Steller's eiders nest. The location of the oil occurrence was a few miles south of the UG survey area. The USGS investigated the source of oil exposure and proposed that the oil originated from natural seeps that leaked from underground reservoirs (USGS 2024, p. 1, 7). The USGS suggests that the crude oil and gas were generated in Lower Cretaceous source rocks, migrated northward into the Avak Creek area, and were trapped there at a shallow depth. Shallowly trapped oil released as the upper permafrost layers deteriorated from warming over the recent 20 years, resulting in remobilization of the shallow oil and gas (USGS 2024, p. 7). Although there was no evidence of Steller's eiders affected by this incidence in 2024, this oil occurrence event presents concerns for future oil contamination originating from natural seeps in the core breeding area for Alaska-breeding Steller's eiders as permafrost thawing continues.

Since the previous status review, a few studies evaluated contaminant exposure in Steller's eiders in Alaska (Miller et al. 2019, p. 830–839; Franson et al. 2023, p. 41–50). Franson et al. (2023) evaluated exposure of Steller's eiders to trace elements, and they compared trace element concentrations in blood of Steller's eiders sampled at the industrialized wintering area of Dutch Harbor (in February 2001) to Steller's eiders sampled at a reference site, Izembek Lagoon, on the lower Alaska Peninsula (in September 2001) (p. 42). They detected 17 trace elements in blood of one or more Steller's eiders (Franson et al. 2023, p. 43); mean concentrations of six trace elements (As, B, Fe, Hg, Se, and Mo) were greater in wintering Steller's eiders at Dutch Harbor than in those molting at Izembek Lagoon, and mean concentrations of four trace elements (Cr, Cu, Mg, and Zn) were greater in eiders at Izembek Lagoon than at Dutch Harbor (p. 43). The authors suggested that the temporal differences in sampling could have played a role in differences in trace element concentrations, particularly for Selenium, which was twice as high in eiders at Dutch Harbor than Izembek Lagoon (p. 45). One Steller's eider from Dutch Harbor (and one harlequin duck) had blood Pb levels above background concentrations (> 0.2 µg/g wet weight), and Pb was detected in 95.6 percent of eiders at Dutch Harbor compared to 30 percent of eiders at Izembek Lagoon (p. 46). Overall, Franson et al. (2023) found greater exposure to several trace elements in Steller's eiders at Dutch Harbor than at Izembek Lagoon, but the authors had no reason to suspect that concentrations found may be associated with adverse effects (p. 47).

On the breeding grounds, ingestion of lead shot may have a high effect on the resiliency of the Alaska-breeding population of Steller's eiders because it directly reduces adult survival and occurs more often in areas where there is a high density of Steller's eiders (i.e., Utqiaġvik). Miller et al. (2019) investigated trace element exposure in five sea duck species (long-tailed ducks, king eiders, spectacled eiders, common eiders, and Steller's eiders) among different areas on the ACP of Alaska (p. 831–833). In 2008 and 2010–2014, 36 nesting Steller's eider females were sampled for blood lead (Pb) concentrations near Utqiaġvik; the mean concentrations were 0.065 ppm (SE = 0.029) and ranged from 0.002–0.996 ppm (Miller et al. 2019, p. 834). Of the 36 nesting Steller's eiders sampled for Pb levels in their blood, 4 hens had Pb levels greater than 0.2 ppm, which is indicative of local, point-source exposure (M. Miller, unpublished data). Long-tailed ducks had similar blood Pb levels to Steller's eiders, with mean concentrations of 0.045 ppm (SE = 0.019; n = 15), suggesting they may be a good surrogate species for sampling Pb exposure (Miller et al. 2019, p. 834).

<u>Extreme weather and marine habitat changes</u>

The SSA (version 1.0) identified harsh weather in the marine environment as a stressor that may affect Alaska-breeding Steller's eiders indirectly (i.e., potentially affecting availability of marine invertebrate prey) or directly (i.e., higher energetic requirements from cold temperatures and high winds). Coastal erosion in the non-breeding range of Steller's eiders may be a potential concern in the future related to harsh weather. Coastal erosion may influence the lagoon systems which Steller's eiders use during the remigial molt-a time they require shallow habitats for feeding that are protected from wave exposure and predation. Harsh storm surges can erode the barrier islands that protect the coastline and lagoon systems, and potentially affect the invertebrate prey communities in nearshore environments. Coastal erosion is primarily due to ocean current, wave action, and storm surges; when high-frequency storm surges are combined with sea ice decline, sea level rise, and high tides, larger waves pose greater risk of coastal erosion.

Coastal habitats are increasingly under threat of erosion by the effects of climate change. Since the last 5-year review, the Army Corps of Engineers (Corps) conducted a statewide threat assessment in remote Alaskan communities, in which Port Heiden and the Village of Nelson Lagoon were identified to be at-risk from coastal erosion (Corps 2019, p. 5–12, A-1). The lagoons adjacent to these communities are used by Pacific Steller's eiders during the remigial molt, and Nelson Lagoon is currently the most important molting habitat used by the Pacific population of Steller's eiders (USFWS 2016b, p. 8). In Nelson Lagoon, most of the eiders have been observed molting near the barrier islands (Kritskoi, Wreck, and Walrus Islands), and to a lesser degree in the lagoon south of the Village of Nelson Lagoon (T. Bowman, retired USFWS-Sea Duck Joint Venture Coordinator, pers. comm.). Recent observations at Nelson Lagoon suggest drastic changes in barrier island morphology are occurring-Walrus Island, one of the barrier islands separating Nelson Lagoon from the Bering Sea, is only a fragment of what it used to be (T. Bowman, pers. comm.). Barrier islands can move, erode, grow, or even disappear; therefore, the effects of coastal erosion can be long-term, everchanging, or unknown.

Coastal lagoons are low energy environments with flow driven by outlet of rivers, streams, and tidal currents, and they are protected by barrier islands (or other natural barriers) that absorb wave energy. The loss of coastal barriers to wave energy leads to sedimentation into the nearshore environment, which both impacts and modifies the nearshore benthic habitats and may result in unsuitable conditions for invertebrates requiring stable attachment surfaces. Nelson Lagoon contains extensive mudflats and beds of blue mussels (*Mytilus edulis*) which are an important food source for Steller's eiders, particularly during the remigial molt period (Petersen 1980, p. 105). Mussels protect themselves from erosion by attaching to the underlying substrate or to conspecifics; while rocky shores provide solid substrate surfaces for mussels to attach to, Nelson Lagoon has soft intertidal substrates (e.g., mud to sand-gravel; Petersen 1980, p. 99). The extent to which coastal erosion may impact other critical habitats (e.g., the Seal Islands, Kuskokwim Shoals) along the Alaska Peninsula is unknown. Nearshore, shallow coastal lagoons in the southern Bering Sea are limited and perhaps sensitive to marine changes-recent benthic surveys conducted in Izembek Lagoon found significant changes in availability of marine invertebrates for molting Steller's eiders (Maliguine 2024, p. 9-10). Changes in marine habitat conditions (e.g., prey availability, refugia habitat) may influence the distribution of the Pacific population and which areas the population uses at different times of their annual cycle (i.e., molting, wintering, staging).

In addition, if storm surges increase in frequency and extent, average pond salinities would be expected to increase in tidally influenced areas such as the Yukon-Kuskokwim Delta (YKD), where Steller's eiders have previously nested. Access to fresh water and associated freshwater invertebrates are considered influential factors for duckling survival (USFWS 2019b, p. 16, 23). Hollmen et al. (2023, p. 1891) found that Steller's eider ducklings (<1 week of age) have adverse behavioral and physiological effects to 6 ppt salinity exposure, suggesting that Steller's eider ducklings cannot survive when they only have access to water with salinity levels exceeding 6 ppt when less than 1 week of age. Coastal tundra landscapes of the YKD are likely inundated more regularly than high latitude areas (such as the Arctic coastal plain of Alaska) because of longer ice-free periods of the Bering Sea, the greater tidal range on the eastern shore of the Bering Sea, and the low elevational gradients (Terenzi et al. 2014, p. 369). As Steller's eiders primarily nest along the ACP near the UT where wetlands are less influenced by storm surges (via tides), it is less apparent if wetland salinization will impact the breeding population of Steller's eiders. Wetland salinization may be less of a concern in the UT where eiders primarily occur, but may limit suitable duckling rearing habitat in the future if eiders needed to expand their breeding distribution.

Analysis of Recovery Criteria (from revised Recovery Plan, USFWS 2021b):

<u>Demographic criteria</u>

There are two alternative demographic criteria that should be met under the revised recovery plan (USFWS 2021b, p. 12–17). Alternatives 1 and 2 have different recovery thresholds based on the knowledge and confidence of the status of the greater Pacific-wintering population. As the size of the Pacific-wintering population is currently unknown and we cannot be 80 percent certain that the Pacific-wintering population is stable or increasing in abundance, we analyzed criteria from alternative 2 of the revised recovery plan (USFWS 2021b, p. 17). The recovery criteria under alternative 2 are summarized as follows:

> "If the size of the Pacific-wintering population is unknown, or if the lower 80 percent confidence limit of the estimated trend in abundance of the Pacific-wintering population is ≤ 1.0, using surveys over the last 5 years but not exceeding 15 consecutive years; *THEN*,
>
> a. Using data from the most recent 20 years, the mean number of Steller's eiders observed in the UG survey area, excluding the area of overlap with the UT survey area, must be ≥ 75, *AND*
> b. Using data from the most recent 20 years, the lower 95 percent confidence limit of the estimated mean number of STEI present in the UT during the breeding season must be ≥ 300, *AND*
> c. Using data from the most recent 20 years, the lower 95 percent confidence limit of the estimated mean number of STEI present in the ACP, but outside the UT, during the breeding season must be ≥ 150, *OR*
> d. Over the most recent 20 years, the lower 95 percent confidence limit of the estimated mean number of STEI present in breeding habitat in Alaska must be ≥ 525, with a wide enough distribution to ensure adequate redundancy and representation"

Under the criteria of alternative 2 of the recovery plan (USFWS 2021b, p. 17), criteria *a-c* or *d* should be met to measure the recovery status of the DPS. We evaluated the criteria using the most recent 20 years of data from the Utqiaġvik Ground, Triangle, and Arctic Coastal Plain survey areas (*a-c* above):

a. The mean number of Steller's eiders observed in the UG survey area, excluding the area of overlap with the UT survey area, (years 2005-2024, no data available for 2020, 2021, or 2024) is approximately 42, which is below the 75 Steller's eider threshold
b. The lower 95 percent confidence limit of the estimated mean number of Steller's eiders present in the UT during the breeding season is approximately 111, which is below the 300 Steller's eider threshold
c. The lower 95 percent confidence limit of the estimated mean number of STEI present in the ACP, but outside the UT survey area, during the breeding season is approximately 59, which is below the 150 Steller's eider threshold

Under alternative 2's demographic criteria *a-c*, the mean number of Steller's eiders observed in the UG survey area (criterion *a*), and the 95% lower confidence limits of the estimated mean number of Steller's eiders present in the UT and ACP (criteria *b* and *c*) were below the recommended threshold for recovery of the DPS. Therefore, the best available data suggest that the Alaska-breeding population of Steller's eiders does not meet the demographic criteria to consider delisting as identified in the recovery plan.

<u>Threats-based criteria</u>

In addition to the above demographics-based criteria, the known threats should be found to not affect the ability of the population to meet and maintain the above demographic criteria. These threats include but are not limited to: ingestion of lead ammunition, mortality from shooting, bird collisions with structures, human disturbance in the breeding area, nest predation, and changes to the ecological community. None of these threats have been ameliorated, and these threats are likely to continue occurring in the future. Whether these stressors impact Steller's eiders at the population-level is not clear, but they likely affect individual Steller's eiders.

Conclusion

Pursuant to the Endangered Species Act (Section 3:6), the term "endangered species" means any species which is in danger of extinction throughout all or a significant portion of its range. 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 Utqiaġvik Triangle. Additionally, the immediacy and urgency of identified stressors is not evident from the numbers of individuals that return to Alaska or from the reproductive rates that have been estimated.

The USFWS determined that the population of Alaska-breeding Steller's eiders meets the definition of threatened—likely to become an endangered species in the foreseeable future (62 FR 31748). Foreseeable future was defined as approximately 30 years, which equates to about three generations. Alaska-breeding Steller's eiders are considered to have low resiliency, as low numbers are annually present in Alaska and have highly variable vital rates, and have low redundancy, as there remains one extant subpopulation with a wide but sparse distribution in most of northern Alaska, with the exception of a higher concentration near Utqiaġvik (Figure 1). Alaska-breeding Steller's eiders have moderate representation, indicated by their varied diet and habitat use, adequate genetic diversity, and wide distribution during the non-breeding season. However, the population remains vulnerable to environmental stochasticity and catastrophic events. Steller's eiders may have some capacity to adapt to environmental changes, but the identified stressors are likely to worsen over time, particularly near Utqiaġvik 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 changes 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 (USFWS 2025, section 7.3.2).

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.

RECOMMENDATIONS FOR FUTURE ACTIONS:

1) Continue to improve survey methods and analysis to obtain estimates of abundance and trend of both the Alaska and Pacific-Russian breeding populations.
2) 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.
3) Continue management actions that increase nest survival or reduce nest depredation of Alaska-breeding eiders.
4) Investigate drivers of breeding effort across the range of Pacific Steller's eiders.
5) Engage in outreach and collaborate with coastal partners (e.g., communities, researchers, industry, government agencies) to maximize conservation efforts for Pacific Steller's eiders.
6) Develop habitat suitability models for Pacific Steller's eiders at each stage of the annual cycle (breeding, molting, wintering, staging, etc.).

Literature Cited

Amundson, C. L., P. L. Flint, R. A. Stehn, R. M. Platte, H. M. Wilson, W. W. Larned, J. B. Fischer. 2019. Spatio-temporal population change of arctic-breeding waterbirds on the arctic coastal plain of Alaska. Avian Conservation and Ecology, 14(1):1-198.

[Corps] U.S. Army Corps of Engineers. 2019. Statewide threat assessment: identification of threats from erosion, flooding, and thawing permafrost in remote Alaska communities. Report #INE 19.03 for the Denali Commission, University of Alaska Fairbanks Institute of Northern Engineering, U.S. Army Corps of Engineers Alaska District. 99 pp.

Douglas, D. C., M. D. Fleming, V. P. Patil, D. H. Ward. 2024. Mapping eelgrass cover and biomass at Izembek Lagoon, Alaska, using in-situ field data and Sentinel-2 satellite imagery. Report, U.S. Geological Survey.

Franson, J. C., T. E. Hollmén, P. L. Flint, A. C. Matz. 2023. Trace elements in blood of sea ducks from Dutch Harbor and Izembek Lagoon, Alaska. Journal of Fish and Wildlife Management, 14(1):41–50.

Hollmen, T. E., P. L. Flint, S. E. G. Ulman, A. Maliguine. 2022. NPRB Project 1814: Are changes in suitability of essential lagoon habitats driving declines of Steller's eiders in the eastern Aleutians? Final Report for the North Pacific Research Board. 62 pp.

Hollmen, T. E., P. L. Flint, S. E. G. Ulman, H. M. Wilson, C. L. Amundson, E. E. Osnas. 2023. Climate change and coastal wetland salinization: Physiological and ecological consequences for Arctic waterfowl. Functional Ecology, 37:1884-1896.

Labunski, E., S. Fitzgerald, A. Kingham. 2022. A Review of Seabird Vessel Strikes in Alaska Groundfish Fisheries 2010-2021. Poster, 49th Annual Pacific Seabird Group Meeting, Virtual.

Maliguine, A. M. 2024. Changes in benthic prey availability and quality suggest less favorable foraging conditions for threatened Steller's eiders (*Polysticta stelleri*) molting at Izembek Lagoon, Alaska. M.S. Thesis. University of Alaska Fairbanks. Fairbanks, Alaska. 66 pp.

Metzner, K. 1993. Ecological strategies of wintering Steller's eiders on Izembek Lagoon and Cold Bay, Alaska. M.S. Thesis. University of Missouri. Columbia, Missouri. 193 pp.

Miller, M. W. C. 2023. Wetland habitat use, protein sources for reproduction, and nest habitat selection by sea ducks facing rapid change in the Alaskan Arctic. PhD Dissertation. Southern Illinois University. Carbondale, Illinois. 268 pp.

Miller, M. W. C., J. R. Lovvorn, N. R. Graff, N. C. Stellrecht. 2022. Use of marine vs. freshwater proteins for egg-laying and incubation by sea ducks breeding in Arctic tundra. Ecosphere, 13(e4138):1-17.

Miller, M. W. C., J. R. Lovvorn, N. R. Graff, N. C. Stellrecht, S. P. Plesh. 2023. Prey availability and foraging activity by tundra-nesting sea ducks: Strong preference for specific wetland types. Ecology and Evolution, 13(e10375):1-23.

Miller, M. W., J. R. Lovvorn, A. C. Matz, R. J. Taylor, M. L. Brooks, T. E. Hollmén. 2019. Interspecific patterns of trace elements in sea ducks: Can surrogate species be used in contaminants monitoring? Ecological Indicators, 98:830–839.

[NOAA Fisheries] National Oceanic and Atmospheric Administration Fisheries. 2020, April 13. IB 20-32: NMFS Reports a Vessel-Strike Mortality of an Alaska-Breeding Population Steller's Eider in the BSAI. https://www.fisheries.noaa.gov/bulletin/ib-20-32-nmfs-reports-vessel-strike-mortality-alaska-breeding-population-stellers

Obritschkewitsch, T., A. R. Bankert. 2024. Steller's eider surveys near Utqiaġvik, Alaska, 2023. Unpublished report for U.S. Fish and Wildlife Service, ABR, Inc. Environmental Research & Services. 27 pp.

Petersen, M. R. 1980. Observations of wing-feather moult and summer feeding ecology of Steller's eiders at Nelson Lagoon, Alaska. Wildfowl, 31:99–106.

Petersen, M. R. 1981. Populations, feeding ecology and molt of Steller's eiders. The Condor, 83(3):256–262.

Plesh, S. P., J. R. Lovvorn, M. W. C. Miller. 2023. Organic matter sources and flows in tundra wetland food webs. PLoS ONE, 18(5):1-26.

Quakenbush, L., R. Suydam. 1999. Periodic nonbreeding of Steller's eiders near Barrow, Alaska, with speculations of possible causes. Pages 34-40 *in* Behavior and ecology of sea ducks (R. I. Goudie, M. R. Petersen, and G. J. Robertson, Eds.). Occasional Paper, Number 100, Canadian Wildlife Service. 89 pp.

Silber, G., D. Weller, R. Reeves, J. Adams, T. Moore. 2021. Co-occurrence of gray whales and vessel traffic in the North Pacific Ocean. Endangered Species Research, 44:177–201.

Swaim, M., H. Wilson, J. Fischer. 2023. Alaska Arctic Coastal Plain Breeding Waterbird Aerial Survey, 2007-Present. Data Release, U.S. Fish and Wildlife Service, Migratory Birds Management, Alaska Region. https://doi.org/10.7944/f6jd-2985

Terenzi, J., M. T. Jorgenson, C. R. Ely. 2014. Storm-surge flooding on the Yukon-Kuskokwim Delta, Alaska. Arctic, 67(3):360-374.

Troy, D. M., S. R. Johnson. 1989. Marine birds. Pages 355-454 *in* Outer continental shelf environmental assessment program: final reports of principal investigators, Vol. 60 (J. C. Truett Ed.). U.S. Department of Commerce, U.S. Department of the Interior. 563 pp.

[USFWS] U.S. Fish and Wildlife Service. 2001. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 1999-2000. Unpublished Report. Prepared by T. Obritschkewitsch, P. Martin, and R. Suydam. Northern Ecological Services, U.S. Fish and Wildlife Service, Fairbanks, Alaska, 113 pp.

[USFWS] U.S. Fish and Wildlife Service. 2002a. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 2001. Unpublished Report. Prepared by T. Obritschkewitsch and P. Martin. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, Alaska, 43 pp.

[USFWS] U.S. Fish and Wildlife Service. 2002b. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 2002. Unpublished Report. Prepared by T. Obritschkewitsch and P. Martin. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, Alaska, 23 pp.

[USFWS] U.S. Fish and Wildlife Service. 2003. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 2003. Unpublished Report. Prepared by N. A. Rojek and P. D. Martin. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, Alaska, 35 pp.

[USFWS] U.S. Fish and Wildlife Service. 2005. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 2004. Unpublished Report. Prepared by N. A. Rojek. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, Alaska, 40 pp.

[USFWS] U.S. Fish and Wildlife Service. 2006. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 2005. Unpublished Report. Prepared by N. Rojek. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 61 pp.

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

[USFWS] U.S. Fish and Wildlife Service. 2008. Breeding biology of Steller's eiders nesting near Barrow, Alaska, 2007. Unpublished Report. Prepared by N. A. Rojek. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 45 pp.

[USFWS] U.S. Fish and Wildlife Service. 2011. Breeding ecology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2008–2010. Unpublished Report. Prepared by D. Safine. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 66 pp.

[USFWS] U.S. Fish and Wildlife Service. 2012. Breeding ecology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2011. Unpublished Report. Prepared by D. Safine. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 65 pp.

[USFWS] U.S. Fish and Wildlife Service. 2013. Breeding ecology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2012. Unpublished Report. Prepared by D. Safine. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 56 pp.

[USFWS] U.S. Fish and Wildlife Service. 2015. Breeding ecology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2013-2014. Unpublished Report. Prepared by D. Safine. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 44 pp.

[USFWS] U.S. Fish and Wildlife Service. 2016a. Breeding biology of Steller's and spectacled eiders nesting near Barrow, Alaska, 2015. Unpublished Report. Prepared by N. Graff. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 52 pp.

[USFWS] U.S. Fish and Wildlife Service. 2016b. Molting Pacific Steller's eider surveys in southwest Alaska, 2016. Unpublished report. Prepared by A. R. Williams, T. D. Bowman, and B. S. Schults. Office of Migratory Bird Management, Anchorage, Alaska. 14 pp.

[USFWS] U.S. Fish and Wildlife Service. 2018. Breeding ecology of Steller's and spectacled eiders nesting near Utqiaġvik, Alaska, 2016-2017. Unpublished Report. Prepared by N. Graff. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 53 pp.

[USFWS] U.S. Fish and Wildlife Service. 2019a. Alaska-breeding population of Steller's eiders (*Polysticta stelleri*) 5-Year Review: Summary and Evaluation. Fairbanks Fish and Wildlife Service, Fairbanks, Alaska. 13 pp.

[USFWS] U.S. Fish and Wildlife Service. 2019b. Status assessment of the Alaska-breeding population of Steller's eiders. Fairbanks Fish and Wildlife Service, Fairbanks, Alaska. 13 pp.

[USFWS] U.S. Fish and Wildlife Service. 2021a. Breeding ecology of Steller's and spectacled eiders nesting near Utqiaġvik, Alaska, 2018-2019. Unpublished Report. Prepared by N. Graff. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska. 52 pp.

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

[USFWS] U.S. Fish and Wildlife Service. 2024. Breeding ecology of Steller's and spectacled eiders nesting near Utqiaġvik, Alaska, 2022-2023. Unpublished Report. Prepared by N. Graff. Fairbanks Fish and Wildlife Service, Fairbanks, Alaska. 43 pp.

[USFWS] U.S. Fish and Wildlife Service. 2025. Status assessment of the Alaska-breeding population of Steller's eiders, Version 2.0. USFWS Northern Alaska Fish and Wildlife Field Office, Fairbanks, Alaska.

[USGS] U.S. Geological Survey. 2024. Avak Creek oil occurrence, Alaska. Unpublished Report. Prepared by P. Botterell, D. Houseknecht, and M. Moldowan. Alaska Petroleum Systems Project. 22 pp.

Ward, D. H., C. J. Markon, D. C. Douglas. 1997. Distribution and stability of eelgrass beds at Izembek Lagoon, Alaska. Aquatic Botany, 58, 229–240.

U.S. FISH AND WILDLIFE SERVICE

5-YEAR REVIEW of the Alaska Breeding Population of Steller's Eider (*Polysticta stelleri*)

Current Classification: Threatened

Recommendation resulting from the 5-Year Review:

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

Appropriate Listing / Reclassification Priority Number, if applicable:

FIELD OFFICE APPROVAL:
Northern Alaska Fish and Wildlife Field Office, Field Supervisor, Fish and Wildlife Service

Approve NEESHA STELLRECHT Digitally signed by NEESHA STELLRECHT Date: 2025.04.15 16:43:10 -08'00'

REGIONAL OFFICE APPROVAL:
Assistant Regional Director – Fisheries and Ecological Services, Fish and Wildlife Service

Approve PETER FASBENDER Digitally signed by PETER FASBENDER Date: 2025.04.15 16:52:22 -08'00'