

Technical Summary

STUDY TITLE: Migration and habitat use by threatened Spectacled Eiders in the eastern Chukchi near and offshore environment

REPORT TITLE: Spatiotemporal distribution and migratory patterns of Spectacled Eiders (BOEM OCS Study 2014-665)

CONTRACT NUMBER: M09PG00012, AK-09-03

SPONSORING OCS REGION: Alaska

APPLICABLE PLANNING AREAS: Beaufort Sea, Chukchi Sea, Hope Basin, Norton Basin, St. Matthew Hall, North Aleutian Basin

FISCAL YEARS OF PROJECT FUNDING: FY 2009–2014

COMPLETION DATE OF REPORT: September 2014

COSTS: FY 2009: \$228,399; FY 2010: \$285,364; FY 2011: \$330,832; FY 2012: \$73,035; FY 2013: \$164,415; FY 2014: \$117,955

CUMMULATIVE PROJECT COST: \$1,200,000

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KEY WORDS: annual cycle, East Siberian Sea, eastern Chukchi Sea, northern Bering Sea, satellite telemetry, site fidelity, migratory connectivity, northern Bering Sea, Norton Sound, *Somateria fischeri*, spatiotemporal distribution, Spectacled Eiders, western Beaufort Sea, western Bering Strait, Yukon-Kuskokwim Delta

BACKGROUND: Spectacled Eiders (*Somateria fischeri*) are sea ducks that spend 9 to 12 months of the year in marine habitats of the East Siberian, Chukchi, Beaufort, and Bering seas where sea ice and benthic prey are important ecological components (Petersen et al. 1998, Petersen et al. 2000, Lovvorn et al. 2009). In the summer months, Spectacled Eiders are divided into three breeding populations in coastal areas of western and northern Alaska and northern Russia. Spectacled Eiders were listed as threatened under the U.S. Endangered Species Act in 1993 (U. S. Fish and Wildlife Service 1993). Contemporary information regarding the spatiotemporal distribution of Spectacled Eiders is needed to expand upon existing knowledge and guide future research, management, and conservation decisions.

OBJECTIVES: 1) Delineate the current range of the species and the location of seasonally used important areas; 2) Estimate the timing of migration and the duration during which important areas were used; 3) Quantify site fidelity to important areas; and 4) Quantify migratory connectivity among important areas.

DESCRIPTION: We implanted a satellite transmitter with percutaneous antenna into the coelom of 129 Spectacled Eiders, including 92 adults (31 males, 61 females) and 37 juveniles (20 males, 17 females) in northern and western Alaska in 2008–2011. We received location data every 4–7 days from each Spectacled Eider, up to 2 years following implantation. We collected a total of 7,184 weekly locations between May 2008 and August 2012. We processed and analyzed the data to identify important areas and the timing of migration, and quantify site fidelity and migratory connectivity.

STUDY RESULTS: We identified seven spatially important areas, including: 1) the western Beaufort Sea within approximately 30 km of the coast of northern Alaska; 2) the eastern Chukchi Sea within approximately 70 km of the coast of northern Alaska; 3) the East Siberian Sea within 200 km of the coast of northern Russia; 4) the western Bering Strait within approximately 60 km of the coast of the eastern Chukotka Peninsula, Russia; 5) eastern and southern Norton Sound in the northeastern Bering Sea; 6) the Yukon-Kuskokwim Delta and adjacent marine areas within approximately 20 km of the coast of western Alaska; and 7) the northern Bering Sea within approximately 200 km of the southern coast of St. Lawrence Island.

Spectacled Eiders wintered exclusively in lead-dominated sea ice in the northern Bering Sea from late November through mid-February. Eiders used Norton Sound and the western Bering Strait during pre-breeding migration (mid-March through early May) and post-breeding migration (mid-July through mid-November). Pre-breeding, Spectacled Eiders also staged offshore in the Yukon-Kuskokwim Delta, eastern Chukchi Sea, and East Siberian Sea in early through mid-May. Important areas used during breeding included terrestrial sites in the Yukon-Kuskokwim Delta, eastern Chukchi Sea, western Beaufort Sea, and East Siberian Sea areas. Eiders occupied the eastern Chukchi Sea and East Siberian Sea through late October, suggesting continued use during molt. Spectacled Eiders departed the Yukon-Kuskokwim Delta and western Beaufort Sea in late July through September, suggesting that these areas were not molting areas. Juvenile Spectacled Eiders that fledged in northern Alaska showed similar post-breeding migratory patterns as adults, although juveniles were more widely distributed across the Bering Sea in early winter. Spectacled Eiders appeared to use direct over-water routes or follow coastlines between important areas.

Spectacled Eiders demonstrated complete interannual fidelity to the species' sole wintering area in the northern Bering Sea. Spectacled Eiders also showed strong interannual fidelity to important areas during pre- and post-breeding migration. Females demonstrated strong interannual fidelity to breeding areas. Males exhibited less fidelity to breeding areas; most spent subsequent breeding seasons in northern Russia after capture at breeding areas in Alaska.

Post-breeding, Spectacled Eiders departed northern Alaska and migrated through the eastern Chukchi Sea, East Siberian Sea, western Bering Strait, or directly to the northern Bering Sea. Spectacled Eiders that departed western Alaska migrated through the western Bering Strait, East Siberian Sea, Norton Sound, or directly to the northern Bering Sea. Males and females demonstrated different post-breeding migratory strategies. Males migrated greater distances to molt in the East Siberian Sea, whereas females migrated shorter distances to molt at sites closer to breeding areas. Post-breeding males that molted in the East Siberian Sea migrated through the western Bering Strait or directly to the northern Bering Sea.

Spectacled Eiders that returned to northern Alaska to breed migrated through the western Bering Strait, East Siberian Sea, and eastern Chukchi Sea, whereas Spectacled Eiders that returned to western Alaska migrated through the western Bering Strait or directly from the northern Bering Sea wintering area. Males migrated to northern Russia through the western Bering Strait or directly from the northern Bering Sea.

SIGNIFICANT CONCLUSIONS: Spectacled Eiders exhibited strong migratory connectivity and site fidelity to the important areas identified in our study. These behavioral patterns created instances where a considerable proportion of a breeding population or the global population seasonally massed in distinct areas. If Spectacled Eiders maintain fidelity to areas undergoing habitat change, managers should expect concurrent change in the status of populations. If Spectacled Eiders respond to habitat change by dispersing to new areas or changing migratory patterns, managers should be prepared to redefine the spatiotemporal distribution of the species and reassess implications for management.

STUDY PRODUCTS:

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- Sexson, M. G., D. M. Mulcahy, M. Spriggs, and G. E. Myers. 2014. Factors influencing immediate post-release survival of Spectacled Eiders following surgical implantation of transmitters with percutaneous antennae. *Journal of Wildlife Management* 78:550–560.

LITERATURE CITED:

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- Petersen, M. R., J. B. Grand, and C. P. Dau. 2000. Spectacled Eider (*Somateria fischeri*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the *Birds of North America Online*: <http://bna.birds.cornell.edu/bna/species/547>.
- U. S. Fish and Wildlife Service. 1993. Final rule to list the Spectacled Eider as threatened. *Federal Register* 58:27374–27480.