Field	Study Information
Title	Assessment and Minimization of Avian Collision and Displacement Risk Associated with Renewable Energy Infrastructure in the Cook Inlet Planning Area, Alaska (AK-25-02)
Administered by	Alaska Regional Office
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Procurement Type(s)	Interagency Agreement
Performance Period	FY 2025–2027
Final Report Due	TBD
Date Revised	10 February 2024
Problem	Avian collisions with infrastructure are a primary obstruction for migratory bird movements. Unlike many other stressors (e.g., disease, invasive species), collision and displacement risk can be mitigated when movement patterns and responses to artificial attractants, such as lighting is better understood (FCC 2021, Longcore et al. 2012). A recent report by the National Renewable Energy Lab (Meadows et al. 2023), showed that Cook Inlet, Alaska has the potential to generate 95 gigawatt (GW) of energy from wind (1 GW can power 300,000 to 750,000 homes representing 2–5 times the number of homes in all of Southcentral Alaska). Lower Cook Inlet including Shelikof Strait, northern Kodiak Archipelago, and the Kenai Peninsula support ≈325 seabird colonies totaling >500,000 breeding birds.
Intervention	This study will identify locations and seasonal use of avian migratory corridors in the Cook Inlet Planning Area using technologies including radar, telemetry, and publicly available datasets that when completed will result in a temporal and spatial assessment of collision and displacement risk.
Comparison	This study will first complete a review of available publications, reports, and data from federal and state agencies including the U. S. Geological Survey Alaska Science Center and U.S. Fish and Wildlife Service Migratory Bird and Refuge Programs; Alaska Department of Fish and Game; academic and research institutions; industry; conservation groups (e.g., Cook Inlet Keepers, Prince William Sound Science Center, Alaska Sea Life Center), and citizen science organizations including the University of Washington Coastal Observation and Seabird Survey Team (https://coasst.org/). This review will: (i) inform seabird and sea duck habitat use in Lower Cook Inlet to produce maps of currently known high use areas and (ii) provide insights and ultimately inform the design of field methods and data collection.
Outcome	Results from this study will assist BOEM with: (i) marine spatial planning of potential renewable energy wind facilities in Cook Inlet, (ii) fulfill obligations related to National Environmental Policy Act (NEPA), Endangered Species Act (ESA) and Migratory Bird Treaty Act (MBTA), and (iii) ultimately serve to reduce impacts to marine birds associated with permitted infrastructure in coastal Alaska. Deliverables will include an outreach component to ensure best management practices are shared broadly with pertinent government,

	nongovernment organizations, and private industry stakeholders, improving their conservation value.
Context	Lower Cook Inlet

BOEM Information Need(s): To assess the potential impacts of renewable energy facilities to migratory birds in Cook Inlet, BOEM needs (i) information on the number, location, and seasonal use of migratory bird corridors; (ii) estimates of number, seasonal use, and types (e.g., seabird, sea duck, shorebird) of migratory birds using corridors across Cook Inlet, (iii) altitudes used by migratory birds to fly across Cook Inlet, (iv) how weather impacts migratory behaviors, (v) risk and consequences of collisions with renewable energy infrastructure; and (iv) recommendations to avoid or mitigate impacts. BOEM needs this information to address regulatory requirements under the ESA, MBTA, and NEPA.

Background: Avian collisions and displacement from infrastructure are a primary concern for migratory bird movements. The increase in offshore industrialization via offshore wind turbines increases risks and consequences of migratory bird collisions and disruptions of migratory movements. Given increased risks of collision and the substantial declines in many species of migratory birds (Hüppop et al. 2016), regulatory agencies should increase efforts to design and implement relevant and feasible mitigation to reduce impacts. Over 40 million or ≈75% of North America's seabirds breed in Alaska (Sowls et al. 1978; Stephensen and Irons 2003). Lower Cook Inlet including Shelikof Strait, northern Kodiak Archipelago, and Kenai Peninsula support ≈325 seabird colonies totaling >500,000 breeding birds. Between 1950 and 2010, the global seabird population declined by 69.7% (Paleczny et al. 2015). In addition to seabirds, Cook Inlet provides winter habitat for Steller's eiders (*Polysticta stelleri*; Larned 2006, Martin et al. 2015) of which the Alaska-breeding population is a threatened species and protected under the Endangered Species Act. Avian collision with offshore infrastructure, including wind turbines presents an additional stress to migratory birds, particularly seabirds and sea ducks. However, unlike many other stressors (e.g., disease, invasive species), collision or displacement risk can be mitigated when movement patterns and responses to artificial attractants, such as lighting are better understood (FCC 2021, Longcore et al. 2012). The National Renewable Energy Lab (Meadows et al. 2023) showed that Cook Inlet, Alaska has the potential to generate 64.5 gigawatt (GW) of renewable wind energy, enough electricity to support all of Southcentral Alaska. In 2023, the State of Alaska revised the Energy Security Task Force to assess not only oil and gas but to increase efforts to develop all forms of energy including wind, solar, hydro, tidal, geothermal, micronuclear, and hydrogen.

Objectives:

1. Determine location and relative importance of avian migratory corridors and seasonal movements in the Cook Inlet Planning Area.
2. Describe the number and proximity of migratory corridors and seasonal movements of migratory birds for two sites identified in Cook Inlet as having the greatest potential for wind facilities.
3. Develop a spatial and temporal model of migratory bird movements in Cook Inlet to determine risk and severity (frequency, magnitude, conservation status) of collisions with offshore wind facilities.
4. Develop conservation measures to avoid, minimize and mitigate impacts to avian migratory corridors from renewable energy infrastructure in Cook Inlet.

Methods: A brief description of proposed methods and estimated costs include:

- Review available scientific peer-reviewed publications, reports including agency gray literature, and data sets from federal and state agencies; universities, colleges, and research institutions; industry, conservation organizations, and citizen-science programs to describe location and seasonal use of avian migratory corridors in the Cook Inlet Planning Area, that would produce maps of currently known high use areas. $40K
- Determine seasonal migratory bird movements from the currently available NEXRAD radar sites that have coverage in Lower Cook Inlet, including PAHG (Kenai) WSR-88D radar operated by the NOAA National Weather Service in Anchorage, Alaska and PAKC (King Salmon) WSR-88D radar operated by the NOAA National Weather Service in Anchorage, Alaska. $130K
- Install localized radar equipment to identify bird movements near Barren Islands or Augustine Island. $200K.
- Assess daily movements and seasonal migrations of seabirds including but not limited to murres, kittiwakes, puffins, and storm-petrels to compare with results described in literature and existing data sets, weather station radar, and localized experimental radar. GPS telemetry of a sample of seabirds in Lower Cook Inlet $300K.

Specific Research Question(s):

1. What are the locations of avian migration corridors in Cook Inlet?
2. What is relative importance of avian migratory corridors across Cook Inlet as measured by seasonal use, frequency of use, and types and numbers of migratory birds?
3. What is the proximity and relative importance of avian migratory corridors to potential sites of renewable wind facilities?
4. How do diurnal movements and seasonal migrations of seabirds compare to corridors identified by weather and localized radar data?
5. Given findings of this study, what marine spatial planning and conservation measures may be designed and implemented to avoid or decrease risks of migratory bird collisions with offshore renewable energy infrastructure?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: N/A

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