Environmental Studies Program: Ongoing Study

Title	Over Water Migration Movements of Black Brant (PC-20-01)
Administered by	Pacific OCS Region
BOEM Contact(s)	David Pereksta (david.pereksta@boem.gov); Timothy White (timothy.white@boem.gov)
Procurement Type(s)	Intra-agency Agreement
Conducting Organization(s)	U.S. Geological Survey (USGS)s
Total BOEM Cost	$500,435
Performance Period	FY 2020–2023
Final Report Due	September 18, 2023
Date Revised	March 24, 2022
PICOC Summary	
Problem	Migrating waterfowl may be impacted by offshore wind turbines including possible turbine avoidance, thus, a reduction in habitat, as well as risk of collision. Black Brant have been identified as a species that could be impacted during their oversea migration along the Pacific coast.
Intervention	Attach tracking devices to 30 Black Brant over 2 years on their breeding grounds in Alaska prior to their southbound migration and on their wintering grounds in California prior to their northbound migration. Collect time series data for up to five years including latitude, longitude, and altitude of the birds as they migrate.
Comparison	Identify oversea Black Brant migratory routes from Alaska to the U.S. Pacific coast to understand pathways, timing, and flight altitude.
Outcome	Use the data collected to characterize potential risk to the species from offshore wind energy development and incorporate into offshore wind turbine micrositing decisions.
Context	Pacific coast of North America (Alaska to California)

BOEM Information Need(s): BOEM needs to address potential bird interactions with offshore wind energy infrastructure off the U.S. west coast. Stakeholder input regarding offshore wind development offshore California has identified that impacts to migratory birds are a concern. In particular, several stakeholders have specific concerns about potential impacts to the Black Brant; a migratory species of goose that breeds in the arctic and winters along the Pacific coast of the U.S. and Mexico. Black Brant have an oversea migration and fly over the Gulf of Alaska (GOA) en masse during fall migration. The entire migrating population have been known to simultaneously depart Izembek Lagoon National Wildlife Refuge, located at the tip of the Alaska Peninsula for long overwater flight to wintering areas on the Pacific Coast. Several critical wintering areas for Black Brant along the coast of California are close to BOEM's Wind Energy Call Areas (Humboldt Bay and Morro Bay). The information collected by this study will be used by BOEM to analyze the effects to Black Brant and other waterfowl from offshore wind energy projects off the Pacific coast of the U.S. and influence the micrositing of turbines if appropriate.

Background: BOEM needs to address potential bird interactions with offshore wind energy infrastructure off the U.S. west coast. Stakeholder input regarding offshore wind development offshore California has identified that impacts to migratory birds are a concern. In particular, stakeholders have specific concerns about potential impacts to the Black Brant, a migratory species of goose that breeds in Arctic and sub-Arctic areas of Alaska and winters along the Pacific coast of the U.S. and Mexico. Most Black Brant follow a trans-oceanic migration in the fall and fly from southwestern Alaska over the Gulf of Alaska *en masse* to coastal areas of Canada, the U.S., and Mexico. In some instances, tens of thousands of Black Brant may leave at once from Izembek Lagoon, at the tip of the Alaska Peninsula, and arrive at multiple locations from coastal British Columbia, Canada, to mainland Mexico. Several critical fall staging and wintering areas for Black Brant along the coast of California are close to BOEM's Call Areas (Humboldt Bay and Morro Bay). The information collected by this study will be used by BOEM to analyze potential effects to Black Brant and other migrating waterfowl from offshore wind energy projects off the Pacific coast of the U.S. and influence the micrositing of turbines if appropriate.

Numerous bird species fly over open ocean throughout their annual cycle and several studies have examined the interaction of these species with offshore wind and other development activities. However, there is little data on how Black Brant use BOEM Call Areas in California and in general, the specifics of the Black Brant migration from Alaska to coastal areas of Canada, Washington, Oregon, and California. In autumn and early winter, many waterfowl leave southwest Alaska and fly over the Gulf of Alaska to make landfall anywhere from the Alaska panhandle to the southern tip of Baja California, but exact spatial and temporal data of these migrations are unknown. The migratory movements of some species of Arctic-nesting geese are currently being tracked. Recent data collected on migration of Greater White-fronted Geese (*Anser albifrons*) and Snow Geese (*Chen caerulescens*) show that tagged geese flew directly from southwest Alaska over open ocean to the northern California coast, passing very closely to or within proposed offshore wind development areas as well as over ocean migration pathways during spring migration back to Alaska (USGS-WERC, unpublished data). Other research has shown that swans and geese were the species most sensitive to disturbance from offshore wind energy infrastructure (Desholm 2009). In a recent vulnerability assessment for marine birds of the California Current System, Black Brant were found to have a 'medium' population collision vulnerability and a 'high' population displacement vulnerability (Adams et al. 2017). In general, recent wildlife tracking data has shown that these efforts can provide detailed spatial and temporal information that may facilitate assessment of potential concerns with offshore wind development and its effects on migrating waterfowl, including Black Brant.

Objective: Collect data on trans-oceanic and coastal migration routes for Black Brant along the Pacific coast of North America to facilitate assessing possible impacts to the species from offshore wind energy development.

Methods:

Task 1: Conduct a literature review and analyses of any available data to assess patterns of variation in migratory patterns for various species of geese making large overwater migrations. Sub-tasks will include 1.) conducting a detailed literature review of studies of migrating waterfowl in Europe at offshore wind farms to access data on effects of weather parameters (wind, ceiling, and visibility) on migratory behavior; and 2) examining available data from waterfowl that make the long distance overwater migration across or along the coast of the Gulf of Alaska in the fall, similar to the path taken by Black Brant. Examination of these data will yield information on flight altitude in relation to wind and distance to shoreline along the Pacific Coast. The combination of these two sub-tasks will allow the development of a general model regarding waterfowl migration across large expanses of open ocean.

Such data will be useful in a general context for specific or future proposed offshore wind developments. Further we will specifically address variation among flocks in flight path and altitude for birds migrating in similar weather conditions.

Task 2: Attach transmitters to Black Brant to collect data on trans-oceanic and coastal migration routes along the Pacific coast of North America. The goal of this task is to collect detailed data on flight paths and altitudes of Black Brant in relation to weather conditions encountered in route. We will deploy backpack-mounted GPS-GSM/GPRS transmitters on adult birds. These packages will allow detailed examination of flight paths and altitudes. We will program transmitters to record more detailed observations once migration commences.

Data Analyses: In route location data will be linked with down-scaled wind and weather data available from multiple sources. We will examine effects of winds and weather parameters on flight paths and altitudes. In particular we will focus on flight altitudes in relation to distance from shore as migrating birds approach the west coast. We will develop a 3-dimensional stochastic simulation that can be used to estimate the probability that flocks of Black Brant encounter proposed offshore wind farms.

Specific Research Question(s):

1. What are the fall and spring migratory routes of Black Brant from Alaska to the Pacific coast of the U.S., including their spatial location, timing, and flight altitudes? In particular, what are the migratory patterns and movement behaviors of Black Brant when they arrive in lower latitude coastal waters after leaving Alaska?
2. Do Black Brant migratory routes overlap with proposed Call Areas for wind energy development off the California coast? What are the average coastal arrival locations and average spatial and temporal distributions of migrating Black Brant in relation to areas of interest for offshore energy development?
3. Can a three-dimensional stochastic simulation be used to estimate the probability that flocks of Black Brant encounter proposed offshore wind developments?

Current Status: The Intra-agency Agreement with USGS was awarded September 18, 2020. Progress since fall 2020 has been delayed by the COVID-19 pandemic due to the inability to travel and conduct fieldwork. Currently, USGS has 30 backpack GPS data loggers that they are expecting to get deployed on Brant over the next year (75% of them in Alaska during fall 2021 and 25% in California during spring 2022 before their northbound migration). Those tags are expected to last a year. A similar tagging effort will follow in 2022-2023.

USGS has also gained access to a massive dataset of GPS data from other geese species along the Pacific coast and has gone through data streams from birds doing trans-ocean crossings. They are assessing backcast models of wind speeds at various altitudes and are developing a model that can describe the altitude birds are likely to migrate at. The Brant data can be applied to this model after it is collected.

Publications Completed: None

Affiliated WWW Sites: https://marinecadastre.gov/espis/#/search/study/100317

References:

Adams J, Kelsey EC, Felis JJ, Pereksta DM. 2017. Collision and displacement vulnerability among marine birds of the California Current System associated with offshore wind energy infrastructure (ver. 1.1, July 2017): U.S. Geological Survey Open-File Report 2016-1154, 116 p.

Desholm M. 2009. Avian sensitivity to mortality—Prioritizing migratory bird species for assessment at proposed wind farms: Journal of Environmental Management. v. 90, no. 8. p. 1,672–1,679.