Environmental Studies Program: Ongoing Study

Title	Birds, Bats, and Beyond: Networked Wildlife Tracking along the Pacific Coast of the U.S. (PC-22-03)
Administered by	Pacific OCS Region
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Procurement Type(s)	Intra-agency Agreement
Conducting Organization(s)	U.S. Geological Survey
Total BOEM Cost	$1,193,880
Performance Period	FY 2022–2026
Final Report Due	March 9, 2026
Date Revised	September 21, 2022
PICOC Summary	
Problem	Offshore wind energy infrastructure poses a variety of threats to birds and bats. Small-bodied migratory species are especially vulnerable, and determining potential impacts to these species is a challenging data gap given the historical size of tracking equipment and formative challenges in tracking logistics and data recovery. Equally important is quantifying available, risk-free areas (and hot-spot areas) at sea associated with normal movements of birds and bats tied to specific populations.
Intervention	Recent technological advances in wildlife tracking using relatively low-cost tags allow delineation of migratory and movement pathways, assessment of regional connectivity, and determination of behaviors.
Comparison	Birds and bats utilize at-sea areas during migration and while foraging and resting. Habitat use at sea is non-random, and high-use areas can be species- and population-specific. Delineating habitat use at sea can help quantify coastal and oversea movement patterns of shorebirds, marine birds, and migratory bats along the Pacific Coast of the U.S., and spatially linked data can be used to evaluate hotspots and limited-use areas.
Outcome	With the expansion of networked VHF (e.g., Motus) and cellular (e.g., GSM) tracking capabilities on the West Coast and initiating several directed tracking efforts, BOEM and others will have the ability to fill critical data gaps for small-bodied, high-vulnerability species and allow for value-added projects in the future by increasing the capacity for large-scale, regional tracking networks.
Context	The initial effort will be in the Southern California Planning Area, with possible subsequent expansion to other areas of the U.S. Pacific Coast.

BOEM Information Need(s): BOEM lacks information needed to analyze bird and bat interactions with offshore wind energy infrastructure off the U.S. West Coast. Birds and bats are susceptible to displacement and collision risks from offshore wind energy infrastructure. Small-bodied species are especially vulnerable, but determining potential impacts is challenging given the limited range in size of

tracking tags and associated challenges in survey methodologies and data recovery. Information about temporal and spatial scales of bird and bat movements collected by this study could inform siting of offshore wind energy areas, inform impacts assessments for proposed projects, describe potential interactions between birds and bats and wind energy facilities, and inform options for minimization and mitigation measures.

Background: Tracking movements of marine birds and bats remains a key challenge for understanding potential wildlife effects of offshore energy development in the Pacific OCS. Bats and birds are known to fly offshore during migration, with frequent and historical accounts of bats flying more than 20 miles offshore. Shorebirds including Red Phalaropes, Red-necked Phalaropes, and Red Knots also migrate offshore during spring and fall, but information about timing and locations of movements is lacking. Marine birds also redistribute seasonally, with less known about post-breeding dispersal and important population-specific wintering locations. More information informing movement ecology will benefit comprehensive assessments of offshore energy project effects.

The Motus Wildlife Tracking System (Motus) is an international collaborative network that uses coordinated, automated VHF radio-telemetry arrays to study movements of small flying organisms including birds, bats, and insects. Motus has been successfully used to gather information about bird movements, stopover sites, migratory routes, timing of migration in relation to environmental conditions, and post-fledging dispersal for a variety of birds including shorebirds and seabirds. Motus has also been employed to investigate seabird use of offshore wind energy areas in the western North Atlantic. Although there are over 1,000 Motus receiving stations around the world (https://motus.org/data/receiversMap), only a few exist on the West Coast of the United States. BOEM has supported Motus tracking along the Atlantic Coast (e.g., Paton et al 2021 and Loring et al 2021); and since 2018, the Pacific Region has received several external stakeholder ideas for Motus-related studies.

Development of a Motus network along the Pacific Coast could elucidate timing and scale of movements for shorebirds, marine birds, and migratory bats in relation to offshore energy and other coastal development projects. A recent initiative led by the Partners in Flight, Western Working Group is expanding the Motus network in the interior west and a new coastal and offshore network would be integrated to better develop flyway-scale efforts. Additionally, the use of animal-borne Cellular Tracking Technology (CTT) in conjunction with Motus-type arrays could expand the reach of automated receivers beyond fixed locations on the mainland, islands, and infrastructure, by including mobile bird-borne receivers that can census VHF tags far from land throughout the expansive ocean ranges. For example, deployment of CTT “Life Tags” on larger birds can greatly expand the spatial extent of receivers at sea to help locate unique ID’s transmitted by tiny (<3 g) solar-powered VHF transmitters attached to smaller co-occurring species.

Objectives:

1. Expand Motus and related (e.g., CTT) tracking capabilities along the U.S. Pacific Coast.
2. Support data-collection efforts on the timing and scale of movements for shorebirds, marine birds, migratory bats, and other taxa in relation to offshore energy and other coastal development projects.
3. Foster collaboration with a variety of partners to enhance a tracking network in the Pacific Region.

Methods: We propose a geographically phased approach to expand Motus and related tracking capabilities along the U.S. Pacific Coast. This study, initially focused in the Southern California Bight (Channel Islands, Santa Barbara Channel, and adjacent mainland), would allow quantification of movements and area use among breeding and migratory seabirds and migratory bats including delineation of migratory connectivity, proportion of bats that migrate offshore, and timing of offshore migratory movements associated with seasonal and environmental conditions (e.g., wind speed, barometric pressure, moon phase, and temperature). For breeding and migratory seabirds we will use Motus and complementary tracking technology to investigate population-specific time spent within designated areas at sea. Motus technology can also be used to evaluate survival among bats that occur offshore. With expanded infrastructure in the future, Motus and related VHF tracking can identify where and when shorebirds and other marine birds (e.g., loons, grebes, seaducks) disperse outside of the breeding season. Expansion of Motus and related VHF tracking to offshore energy infrastructure, coupled with bird-borne tracking could also be used to examine offshore movements for any avian species, especially those identified as potentially vulnerable to offshore wind energy development by Adams et al. (2017). This project will allow for the deployment of Motus and integrated VHF tracking to improve knowledge of aerial wildlife movements in offshore environments and help address data gaps associated with the expansion of energy development in the Pacific Ocean.

The first phase of establishing an array of receiving stations along the U.S. Pacific Coast will focus on a network of Motus towers throughout the Southern California Bight (SCB), including mainland, island, and oil platform stations. The SCB area will be a "lab" of densely-sited receivers to address finer-scale movements and habitat use and to develop tracking methodologies. During this first geographically constrained study, tracking efforts will focus first on bats and small, most vulnerable breeding marine bird species (Ashy Storm-Petrel, Scripps's Murrelet, Cassin's Auklet). We will use integrated VHF-GSM technology to include Western Gulls as mobile stations to increase detections for small birds at sea beyond the range of fixed receiving stations. Results would provide increased resolution of high-use areas within range of the network (near islands, Santa Barbara Channel, interisland passages, and use of areas in the vicinity of energy and oil platform infrastructure). Tracking efforts could be expanded to include other breeding and migratory seabird species also at local scale (e.g., pelicans, cormorants, murres, shearwaters). Partners for this regional effort would include Channel Islands National Park and the U.S. Navy. In the future, following network infrastructure and proof of concept, networked VHF tracking could be scaled up to include Trinidad Head near the Humboldt Call Area, the Pacific Coast, and ocean waters throughout the Pacific OCS.

Specific Research Questions:

1. How can networked VHF tracking technology (e.g., Motus) best be applied to studying birds and bats in the marine environment of the Pacific OCS?
2. How do movements and habitat use at sea of small-bodied birds and migratory bats overlap with offshore energy infrastructure (e.g., platform structures in the SCB)?
3. How much time do tracked animals spend within areas at sea covered by networked receiving stations? Does habitat use reveal sufficient areas available for vulnerable breeding populations (e.g., Ashy Storm-Petrel, Cassin's Auklet, and Scripps's Murrelet) at sea that would be free from potential risks associated with offshore energy development?
4. Can we use networked VHF and GSM technology to expand the range of fixed towers and to better estimate flight-height for animals at sea (e.g., co-tagging of Western Gull)?
5. How frequently do resident bats on the Channel Islands fly offshore or make interisland flights?

6. What are the proportions of migratory bats that migrate offshore throughout the SCB and what is the survival rate of individuals moving offshore?

Current Status: The Intra-agency Agreement between BOEM and USGS was awarded on September 9, 2022.

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

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