Environmental Studies Program: Studies Development Plan | FY 2022–2023

Title	Tracking Movements of Common Terns Staging on Muskeget Island (AT-22-04)
Administered by	Office of Renewable Energy Programs
BOEM Contact(s)	David Bigger (David.bigger@boem.gov)
Procurement Type(s)	Inter-Agency Agreement
Conducting Organization(s)	TBD
Total BOEM Cost	TBD
Performance Period	FY 2022–2024
Final Report Due	TBD
Date Revised	April 16, 2021
PICOC Summary	
Problem	There are significant information gaps regarding whether migrating terns pass through areas leased for wind energy development and what proportion of the population may be exposed to this development. Movements derived from nano-tagged birds and the network of automated receiving stations (MOTUS) give clues on migration.
Intervention	Deploy PinPoint GPS-Argos tags to more precisely describe post-breeding offshore movements of terns.
Comparison	Compare predicted movements derived from MOTUS technology to movements described with newer technology (GPS-Argos).
Outcome	Detailed maps describing offshore movements of individual post-breeding terns; validation of movements derived from MOTUS technology with the new GPS-Argos tracking technology.
Context	Northeast Atlantic

BOEM Information Need(s): BOEM has a responsibility to assess the risks of offshore wind energy development to migratory bird species. Shorebird species, including terns, migrate through areas that will be developed for offshore wind. Information from this effort will be used to inform NEPA analyses and ESA Section 7 consultations on the risk of offshore wind development projects to migratory shorebirds while exploring the use of emerging technology to better track the movements of shore birds during fall migration.

Background: The common tern (*Sterna hirundo*) is a high-priority species for monitoring at existing and potential offshore Wind Energy Areas (WEAs) in the U.S. Atlantic Outer Continental Shelf (OCS) due to its offshore habitat use and life history similarities with the federally endangered roseate tern (*Sterna dougallii dougallii*). Previous studies on the movements of common and roseate terns in the U.S. Atlantic OCS have primarily used digitally coded radio transmitters and land-based automated telemetry stations in coordination with the Motus Wildlife Tracking System (Loring et al. 2017, 2019). Although these studies provided new information on regional movements of terns, information on offshore movements was limited by detection range of land-based telemetry stations (generally < 15 km). Recent advances in

tracking technologies are increasing opportunities to track terns in offshore environments: newly available GPS-Argos transmitters that use GPS technology to acquire high-resolution location data and the Argos system to relay data via satellite to the internet. This study will use both types of technology (automated radio telemetry and GPS-Argos) to collect new information on offshore movements of common terns captured during the post-breeding period at staging areas in the Cape Cod and Islands region of southeastern Massachusetts.

Muskeget Island is a small island between Martha's Vineyard and Nantucket Islands and was historically one of the largest tern colonies in Massachusetts until it was abandoned in 1948; yet, the island is still used consistently as a staging site during the post-breeding period (Jedrey et al. 2010) and is one of the only known roost sites for terns in Massachusetts (J. Spendelow, pers. comm.). Terns have recently begun recolonizing Muskeget, with Mass Audubon reporting approximately 500 pairs of common and 40 pairs of roseate nesting in 2020 (P. Loring, pers. c); Muskeget Island is also <30 km north from the boundary of the Massachusetts WEA.

Objectives:

1. Summarize meteorological conditions (wind speed, wind direction, visibility, and precipitation) and timing (time of day, day of year) of offshore flights in the Atlantic OCS.
2. Map movement patterns and flight altitudes of common terns during the post-breeding period and fall migration.

Methods: Field crews will conduct surveys on Muskeget Island to locate staging flocks of common terns and specific sites to deploy mist nets. Target timing for trapping is 15 August to 15 September to attempt to maximize the number of transmitters deployed on terns that are likely to depart from the Atlantic coast. PinPoint Argos-75 GPS Transmitters (Lotek Wireless, Ontario, Canada) will be attached to a subset (n=30) of After Hatch Year common terns. Shell, in partnership with USFWS, is currently using this technology on red knots near their lease off New Jersey. These transmitters collect a total of 60 GPS locations and will be programmed to optimize data collection during time periods when migratory departure is most likely to occur (e.g., within 4 hours of local sunset) to increase likelihood of collecting location data while birds are offshore. Location data will be relayed online in via the Argos satellite system (https://www.argos-system.org/). In addition, digitally coded radio tags ('PowerTags'; Cellular Tracking Technologies; Rio Grande, NJ) will be attached to a subset (n=30) of common terns. PowerTags will be programmed to transmit UHF signals (434 MHz) every 5 seconds for a total of 5 months. Signals from PowerTags will be monitored by automated radio telemetry stations within the Motus Wildlife Tracking System (www.motus.org).

Data collected by field surveys will be used to document the timing, abundance, and distribution of common terns staging on Muskeget Island between Aug 15 and Sept 15. Prey composition will be summarized using observations of prey deliveries in tern flocks and results from DNA analysis of fecal samples collected from terns during trapping. Data collected by GPS transmitters will be analyzed using R and mapped using ArcGIS. Data from CTT PowerTags will be used to quantify length of stay of tagged terns on Muskeget and to monitor regional movements from stations on Nantucket, Nomans Land Island, offshore monitoring buoys in the Equinor lease area in the Massachusetts WEA, and the Block Island Wind Farm. These efforts will contribute towards the development of a monitoring framework for automated radio telemetry studies at offshore wind areas throughout the US Atlantic by the USFWS and partners with funding from NYSERDA. In addition, GPS and radio-telemetry data will be coordinated with a current BOEM-funded effort to develop a stochastic collision risk model in partnership with the USFWS

and University of Rhode Island. Lastly, the methodologies developed in this study will be used to develop a future tracking study on the endangered roseate tern.

Specific Research Question(s): How do predicted tern movements derived from older technology compare to movement described with newer technology?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

Loring PH, Ronconi RA, Welch LJ, Taylor PD, Mallory ML. 2017. Postbreeding dispersal and staging of Common and Arctic Terns throughout the western North Atlantic. Avian Conservation and Ecology 12(2):20.

Loring PH, Paton PWC, McLaren JD, Bai H, Janaswamy R, Goyert HF, Sievert PR. 2019. Tracking offshore occurrence of Common Terns, endangered Roseate Terns, and threatened Piping Plovers with VHF Arrays. US Department of the Interior, Bureau of Ocean Energy Management, Sterling, Virginia.

Jedrey E, Harris R, Ray E. 2010. Roseate Terns--Citizens of the world: the Canada to Cape Cod connection. Bird Observer 38(3):146-150.