Environmental Studies Program: Studies Development Plan | FY 2023–2024

Title	Assessing Avian Collision-Risk for Offshore Wind Development in the Gulf of Mexico: A Remote Sensing Approach (GM-23-01)
Administered by	Gulf of Mexico OCS Regional Office
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Procurement Type(s)	Inter-agency Agreement
Conducting Organization(s)	U.S. Fish and Wildlife Service (USFWS) and U.S. Geological Survey (USGS)
Total BOEM Cost	TBD
Performance Period	FY 2023–2028
Final Report Due	TBD
Date Revised	February 7, 2022
PICOC Summary	
Problem	Approximately two billion birds migrate through the northern GOM region, where offshore wind energy development on the OCS is expected. Additionally, two Endangered Species Act- (ESA-) listed and one ESA-proposed species use airspace in these same areas during much of the year. High uncertainty on the distributions and altitudes of birds offshore could create conflict between wind operations and environmental regulations.
Intervention	The study will apply remote sensing methods (portable radar and passive acoustics) offshore to understand the seasonal height, distribution, abundance, and phenology of birds over open GOM waters. These data will inform siting and management recommendations and/or mitigation measures to minimize turbine-related mortality (incidental take) and other adverse effects of birds within the GOM.
Comparison	The study will conduct comparisons across seasons and sampling locations in bird abundance and altitudinal distribution will capture temporal and geographic structure that may be important in siting decisions. Data collection will be replicated across several successive years to address interannual variation. This information would also complement existing BOEM-funded efforts (e.g., the Gulf of Mexico Marine Assessment Program for Protected Species) by providing hard-to-gather information on flight altitudes over open water.
Outcome	Provide important information to inform BOEM, USFWS, and Bureau of Safety & Environmental Enforcement regulatory needs. This includes 1) the number of birds typically expected within the rotor-swept zone, 2) environmental covariates related to flight altitude, and 3) collision risk assessment across space and time.
Context	Industrial energy activities in GOM Region

BOEM Information Need(s): Additional information is needed to assess the potential for reducing avian mortality due to collisions with offshore wind turbines in the Gulf of Mexico (GOM), particularly during spring and fall bird migration (e.g., Cohen et al. 2017, Horton et al. 2019, Clipp et al. 2021). Data on the

height, distribution, abundance, and phenology of avian movement patterns are needed to inform offshore wind energy development planning decisions given that each spring and fall billions of birds migrate across the GOM as part of their annual life cycle (Horton et al. 2019). This is in addition to the federally listed Piping Plover and Red Knot, and the proposed listed Black-capped Petrel, all of which regularly use the airspace over the open Gulf.

Background: Over two billion birds representing some five-hundred species use GOM habitats each year (Fourneir et al. 2019). Included among these species are the federally listed Piping Plover and Red Knot, as well as the proposed listed Black-capped Petrel (Jodice et al. 2021), all of which occupy airspaces over the open Gulf. The peak abundance of birds occurs during the spring and fall migration seasons, but the two ESA-listed and one ESA-proposed species in the Gulf typically occur during the fall-winter and spring-fall months, respectively. Understanding when, where, and at what height birds are moving over the Gulf throughout the year can inform wind development siting and other mitigation measures.

Collision-related bird mortality in the GOM has precedent. Russell (2005) estimated 200,000 avian deaths per year over the entire oil and gas (O&G) platform archipelago in the GOM. Collisions accounted for 34% and 48% of the mortality observed in spring and fall, respectively. Russell (2005) likely underestimated avian mortality given limits to carcass detection. Mortality of trans-Gulf migrants associated with offshore wind energy may considerably add to and even exceed those already attributed to O&G platforms, given potential build-out of wind energy in the Gulf and the increasing size of turbine rotor-swept zones. Additionally, these threats may impact the two ESA-listed and one ESA-proposed species utilizing airspace over Gulf waters. This suggests exposure risk to wind energy development may be consequential for most of the calendar year for a variety of species under conservation concern. Considering bird abundance in North America declined by 29% over the last 50 years (Rosenberg et al. 2019), wind development in the GOM would be another source of additive mortality increasing the number of anthropogenic threats known to negatively impact avian populations.

Since the emergence of utility-scale wind energy production, efforts to understand and mitigate collision risk between flying animals and turbines have been challenged by the biological and technological complexities of the problem. Birds and bats vary widely in their habits and flight behavior, yet Federal and state regulatory agencies are mandated to respond to legal protections for flying animals (e.g., ESA, Migratory Bird Treaty Act, National Environmental Policy Act). This challenge is compounded by forecasted growth in terrestrial and offshore wind energy production of 435% between 2020 and 2051; this in addition to offshore wind accounting for a record 10% of new wind installations in 2020. The growing interest in offshore wind development poses a potential hazard to birds that is unremitting, since these developments have an operational life span of 25–30 years. Measuring impact of offshore wind facilities is especially challenging considering the difficulties of post-construction fatality detection and high uncertainty in offshore bird distributions and flight altitudes.

Radar is one of the few remote sensing technologies that can capture data on the passage rates and vertical distributions of flying animals throughout the day and night. The use of portable radar in the offshore environment to assess seasonal height, distribution, abundance, and phenology of birds better ensures data collection at geographic areas and altitudes specific to offshore wind energy development. Acoustics will aid in determining the species composition of the bird scatterers detected by the radar systems. In this way, the proposed research complements an existing study on the National Studies List that proposes to examine bird movements using data from weather radar continuously over fine and broad scales to monitor bird movements at medium and high altitudes. Portable radar has the potential to address uncertainty at the local level at the scale of a specific wind turbine. Whereas weather radar

can extract bird-like scattering over much larger distances and higher altitudes. Developing a multi-modal framework by combining data streams from these systems at multiple vertical and horizontal scales can address uncertainties concerning potential local and cumulative migratory bird interactions across the GOM in association with wind energy development.

Objectives: The proposed study will determine:

- Spatial and temporal patterns in avian abundance and distribution throughout the year in areas slated for offshore wind development.
- The flight altitudes of birds, bats and potential species composition in the airspace over the open ocean.

Methods: Deployment of multiple acoustic sensors and X-band radars modified for biological data collection to measure altitude stratification, geographic distribution, passage rates, species identification, abundance, and phenology from vessels, O&G platforms, and other suitable offshore testing platforms. Timeline of project envisioned as multi-season to capture baseline spring and fall migration, and multi-year to quantify interannual variability. Multiple sampling locations are required to calibrate a geographic baseline gradient of migration intensity. The use of vessels allows greater spatial coverage around the GOM, whereas platform deployment will be prioritized in areas slated for wind development or suitable for testing purposes. On vessels, motion compensation, sea clutter mitigation, and advanced methods of target discrimination (Schmaljohann et al. 2008) will be integrated into a single radar platform suitable for the offshore environment. Human observers will supplement and corroborate radar observations with taxon-specific information on distribution and behavior. Radars deployed on O&G platforms are freed from the complications of platform motion and complement vessel-based observation by enabling long-duration (months to years with occasional service), cost-effective data collection. he proposed deployment of portable radar units is highly scalable depending on the level of support. The collected data will allow us to compare bird abundance and altitudinal distribution across space and time, which will capture temporal and geographic structure that may be important in siting decisions, including mitigations such as potential seasonal curtailment. Additionally, this study will calculate the proportion of birds within the rotor-swept zone over space and time as well as determine associations between flight height and environmental covariables.

Specific Research Question(s):

1) What are the spatiotemporal patterns of birds and possibly bats in areas slated for offshore wind development across the annual cycle?
2) What altitudes are birds utilizing when flying over open water?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites:

https://gomamn.org/

https://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/Birds_Strategic_Framework_06.23.17.pdf

https://gomamn.org/wp-content/uploads/2020/02/GoMAMN.pdf

References:

[BOEM] Bureau of Ocean Energy Management. 2012a. Gulf of Mexico oil and gas lease sales: 2012-2017 Western Planning Area lease sales 229, 238, 246, and 248 and Central Planning Area lease sales 227, 231, 235, 241, and 247: Final environmental impact statement: Volume I: Chapters 1-4.1. New Orleans (LA): U.S. Department of the Interior, BOEM, Gulf of Mexico OCS Region. 710 p. OCS EIS/EA BOEM 2012-019.

BOEM. 2012b. Gulf of Mexico oil and gas lease sales: 2012-2017 Western Planning Area lease sales 229, 238, 246, and 248 and Central Planning Area lease sales 227, 231, 235, 241, and 247: Final environmental impact statement: Volume II: Chapters 4.2-4.5 and 5. New Orleans (LA): U.S. Department of the Interior, BOEM, Gulf of Mexico OCS Region. 714 p. OCS EIS/EA BOEM 2012-019.

Clipp HL, Buler JJ, Smolinsky JA, Horton KG, Farnsworth A, Cohen EB. 2021. Winds aloft over three water bodies influence spring stopover distributions of migrating birds along the Gulf of Mexico coast. Ornithology 138:ukab051.

Cohen EB, Barrow Jr WC, Buler JJ, Deppe JL, Farnsworth A, Marra PP, McWilliams SR, Mehlman DW, Wilson RR, Woodrey MS, Moore FR. 2017. How do en route events around the Gulf of Mexico influence migratory landbird populations? The Condor: Ornithological Applications 119:327–343.

Fournier AMV, Woodrey MS, Wilson RR, Sharuga SM, Reeves DB. 2019. Challenges, opportunities, and stakeholder values. In: Wilson RR, Fournier AMV, Gleason JS, Lyons JE, Woodrey MS, editors. Strategic bird monitoring guidelines for the northern Gulf of Mexico. Starkville (MS): Mississippi State University: Mississippi Agricultural and Forestry Experiment Station. p. 15–24. Report No.: Research Bulletin 1228.

Horton KG, Van Doren BM, La Sorte FA, Cohen EB, Clipp HL, Buler JJ, Fink D, Kelly JF, Farnsworth A. 2019. Holding steady: little change in intensity or timing of bird migration over the Gulf of Mexico. Global Change Biology 25:1106–1118.

Jodice PGR, Michael PE, Gleason JS, Haney JC, Satgé YG. 2021. Revising the marine range of the endangered black-capped petrel Pterodroma hasitata: occurrence in the northern Gulf of Mexico and exposure to conservation threats. Endangered Species Research 46:49–65.

Rosenberg KV, Dokter AM, Blancher PJ, Sauer JR, Smith AC, Smith PA, Stanton JC, Panjabi A, Helft L, Parr M, Marra PP. 2019. Decline of the North American avifauna. Science 366:120–124.

Russell RW. 2005. Interactions between migrating birds and offshore oil and gas platforms in the northern Gulf of Mexico: final report. New Orleans (LA): U.S. Department of the Interior, Minerals Management Service. 330 p. Report No.: OCS Study MMS 2005-009.

Schmaljohann H, Liechti F, Bächler E, Steuri T, Bruderer B. 2008. Quantification of bird migration by radar–a detection probability problem. Ibis 150:342–355.

[USDOI] U.S. Department of the Interior. 2009. Memorandum of Understanding between the U.S. Minerals Management Service and U.S. Fish and Wildlife Service regarding implementation of Executive Order 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds.” Washington (DC): U.S. Department of the Interior. 17 p.