Environmental Studies Program: Ongoing Study

Title	Seabird and Marine Mammal Surveys Near Potential Renewable Energy Sites Offshore Central and Southern California (PC-17-01)
Administered by	Pacific OCS Region
BOEM Contact(s)	David Pereksta (david.pereksta@boem.gov)
Procurement Type(s)	Intra-agency Agreement
Conducting Organizations(s)	U.S. Geological Survey
Total BOEM Cost	$1,999,997
Performance Period	FY 2017–2022
Final Report Due	June 6, 2022
Date Revised	March 24, 2022
PICOC Summary	
Problem	With recent interest from the renewable energy industry in leasing areas for wind and wave energy developments offshore central and southern California, BOEM will need to update information on the distribution and abundance of sensitive resources in these Planning Areas, including seabirds and marine mammals.
Intervention	This study will provide up-to-date information on species composition, distribution, abundance, and seasonal variation of seabirds from the southern limit of the Monterey Bay National Marine Sanctuary to the U.S.-Mexico border. In addition, data will be opportunistically collected on marine mammals that are observed during the surveys.
Comparison	This study will repeat and refine the methodology used in earlier studies to provide up-to-date information and establish a more robust longitudinal data set from which to draw on for environmental analyses.
Outcome	Data generated will be used for environmental review of renewable energy projects proposed in this area, including those under the National Environmental Policy Act and Endangered Species Act.
Context	Southern California

BOEM Information Need(s): With recent interest from the renewable energy industry in leasing areas for wind and wave energy developments offshore central and southern California, BOEM will need to update information on the distribution and abundance of sensitive resources in these Planning Areas, including seabirds and marine mammals. This study will be designed to provide up-to-date information on species composition, distribution, abundance, and seasonal variation of seabirds from the southern limit of the Monterey Bay National Marine Sanctuary to the U.S.-Mexico border. In addition, data will be opportunistically collected on marine mammals that are observed during the surveys. Data generated will be used for environmental review of renewable energy projects proposed in this area, including those under the National Environmental Policy Act and Endangered Species Act.

Background: The Southern California Bight and the central coast of California provide habitat for numerous seabird species. More than 20 species of seabirds breed in this region, primarily on the Channel Islands. This is the only region in California supporting breeding Black Storm-Petrels (*Oceanodroma melania*), Brown Pelicans (*Pelecanus occidentalis*), Scripps's Murrelets (*Synthliboramphus scrippsi*), and Elegant Terns (*Thalasseus elegans*). The area also contains nearly half of the world population of Ashy Storm-Petrels (*Oceanodroma homochroa*). In addition, numerous seabirds migrate through or winter in this region.

Several project proponents are interested in developing renewable energy projects (both wind and wave) in this region, including a commercial-scale wind project off of Morro Bay. The installation and operation of renewable energy devices at sea has the potential to affect seabirds and marine mammals. Activities that can have effects on these species include construction and operational activities, vessel traffic, seismic surveys, foundation and cable installation, turbine operation, foundation protection, and cables. Resulting effects include collision and entanglement, prey base and habitat alteration, displacement, movement barriers, EMF effects, light attraction, pollution, and noise impacts.

The Bureau of Land Management (BLM) and the Minerals Management Service (MMS) funded seabird and marine mammal surveys in the Southern California Bight in 1975–1978 (Briggs et al. 1981), in central and northern California in 1980–1983 (Dohl et al. 1983), and in southern and central California in 1999–2002 (Mason et al. 2007). While these surveys provide a good foundation of information for the area, they should be updated given the shifts of species' distribution and abundance that may have occurred over the past four decades. This study will repeat and refine the methodology used in earlier studies to provide up-to-date information and establish a more robust longitudinal data set from which to draw on for environmental analyses. The results will include digital raster maps of species distributions within state and federal waters. Results will be provided in scientific presentations, peer reviewed scientific papers, and in a readily accessible, comprehensive marine GIS package.

Objectives: Objectives of this study are: 1) Update BOEM's understanding of the status and distribution of seabirds and marine mammals in areas off the coast of central and southern California where renewable energy projects may be proposed; and 2) Relate this new information to that collected by other surveys on this portion of the Pacific OCS over the last 40 years.

Methods: Seasonal aerial surveys offshore central and southern California will be conducted over a 2 to 3-year period. These surveys will be designed to match those flown in the previous studies mentioned above along historical transect lines between Cambria (35° 35' N) and the U.S-Mexico border (32° 32' N). In addition, finer-scale focal areas will be established and surveyed in areas where there is a higher potential of renewable energy project development, including the Santa Rosa Flats, offshore of Morro Bay, offshore of Vandenberg Air Force Base, the western Santa Barbara Channel, and any other areas identified by BOEM. The surveys will characterize the current diversity, distribution, and abundance of seabirds and marine mammals within the study area at a scale that is useful for assessment of renewable energy proposals. Survey methodologies used in previous studies will be reviewed and modified, as necessary, to account for new technologies and equipment availability. A potential complement to this survey effort would be the use of other technologies, such as horizontal and vertical avian radar, to survey spring and fall cross-shelf migration windows in the California Current.

This study will include seasonal aerial surveys along prescribed transect lines supplemented by other sources of aerial/shipboard data collected over the past 40 years, as available. Previously collected data

will be assessed and analyzed to allow for comparisons with the newly collected data to identify changes in distribution and abundance of seabirds over the last 40 years.

Specific Research Question(s):

1. What is the current status and distribution of seabirds and marine mammals in areas off the coast of central and southern California where renewable energy projects may be proposed?

2. How has the distribution and abundance of seabirds changed over the last 40 years in this region?

Current Status: The BOEM-USGS intra-agency agreement was awarded on June 7, 2017. In August 2017, USGS initiated efforts to define their capacity for conducting aerial digital survey techniques to quantify the abundance and distribution of animals at and near the surface of the ocean. Traditionally, in the Pacific this has been accomplished using human observers at low elevation (60 m ASL) scanning relatively narrow (50–75 m swaths). Discussions were initiated with USGS researchers in Santa Cruz who have developed plane-mounted camera systems for landscape imagery and 3-D mapping, and also engaged several groups (for profit and non-profit) that have conducted digital aerial surveys in the Atlantic. Digital methods have not yet been trialed in the eastern Pacific. The technology-testing period included the following accomplishments:

- Established contract agreements to conduct test-flights
- Created library of digital aerial survey literature
- Created spreadsheet-calculator to compare camera parameters (e.g. sensor dimensions, focal length, pixel resolution, ground sample distance [GSD; cm pixel^{-1}]) and evaluate response and recommended settings (e.g., shutter speed) at various altitudes and flight speeds
- Performed survey evaluations using belly-mounted cameras and refined survey equipment based on the results

Surveys were initiated in 2018 and include the following accomplishments:

- Developed survey protocol and conducted survey training
- Finalized data collection set-up for Fall survey window
- Initiated flight contracts for Fall 2018 survey window
- Hired staff to assist with the study
- Completed Fall digital aerial survey
- Developed and refined field to office data transfer, electronic file storage and back-up protocol
- Developed R code to build a robust database of all flight parameters from the Fall survey
- Used plane altitude and speed thresholds, as well as plane heading to select appropriate images for analysis
- Debriefed Fall survey and determined modifications to data collection system
- Refined automated target detection code and image processing
- Evaluating sub-set of images to develop a small training dataset and test efficacy of a Faster R-CNN for object detection
- All employees furloughed 12/22/2018 – 1/25/2019
- Completed bench-testing a new camera system in February 2019 and conducted test flights in March 2019
- Finalized Spring Migration survey methodology

- Flew first replicate (three flights) of Spring Migration survey in March. Poor weather (rain, low clouds and wind) prevented additional flights in March
- Developed data transfer, back-up, and processing protocol for files from each piece of hardware, and refined flight metadata
- Generated R Code to work with data from Spring Migration survey, including summaries and data visualizations to check data from each piece of hardware
- Created separate databases of track information and image information to perform additional calculations and data queries
- Continued development of workflow for object detection with machine learning

Progress since spring 2020 has been delayed by the COVID-19 pandemic due to the unavailability of personnel and equipment. This resulted in some delays in field work. This, coupled with delays from the government shutdown (12/22/2018-1/25/2019), required an extension to the project timeline to complete data analysis and development of deliverables. The final report is due in June 2022.

Publications Completed: None

Affiliated WWW Sites: https://marinecadastre.gov/espis/#/search/study/100180

References:

Briggs KT, Chu EW, Lewis DB, Tyler WB, Pitman RL, Hunt GL Jr. 1981. Distribution, numbers and seasonal status of seabirds of the Southern California Bight Area, 1975–1978. Summary of marine mammal and seabird surveys of the Southern California Bight Area, 1975–1978, Vol. III. Investigators Reports, Part III: Seabirds, Book I, Chapter I. U.S. Department of the Interior, Bureau of Land Management: BLM/YN/SR-81-03. 337 p.

Dohl TP, Bonnell ML, Guess RC, Briggs KT. 1983. Marine mammals and seabirds of central and northern California, 1980–1983: Executive summary. U.S. Department of the Interior, Minerals Management Service: OCS Study MMS 84-0041. 29 p.

Mason JW, McChesney GJ, McIver WR, Carter HR, Takekawa JY, Golightly RT, Ackerman JT, Orthmeyer DL, Perry WM, Yee JL, Pierson MO, McCrary MD. 2007. At-Sea Distribution and Abundance of Seabirds Off Southern California: A 20-Year Comparison. Studies in Avian Biology 33:1-95.