

Environmental Studies Program: Ongoing Study

Field	Study Information
Title	Tag You're It! Habitat Use of Whales of the U.S. West Coast and Hawai'i (PC-22-04)
Administered by	Pacific OCS Regional Office
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Procurement Type(s)	Cooperative Agreement and Interagency Agreement
Conducting Organization(s)	Oregon State University (OSU) and U.S. Navy
Total BOEM Cost	\$300,000
Performance Period	FY 2022–2024
Final Report Due	March 27, 2024
Date Revised	November 2, 2023
Problem	There are currently no commercially operational offshore floating wind facilities to inform the siting of potential wind energy sites offshore Hawai'i as it relates to the potential impacts of these developments on humpback whales. Additionally, with the beginning of decommissioning activities on the horizon in the Santa Barbara Channel area, the potential impacts to large whale species need to be assessed.
Intervention	Collate and analyze existing whale telemetry data to identify residence times, home ranges, seasonal shifts, hot spots of aggregation, and dive profiles of large whale species to better understand habitat usage.
Comparison	These results can be used as baseline data and compared with during and/or post construction monitoring to evaluate and/or validate potential impacts from these and other activities.
Outcome	Derive spatially and temporally consistent data products or layers of whale occurrence, movements, and behavior offshore Hawai'i and in the Santa Barbara Channel area to help inform decisions about the siting of offshore floating wind development as well as the timing of conventional energy decommissioning activities.
Context	California, Oregon, Washington, and Hawai'i

BOEM Information Need(s): BOEM needs data on large whale occurrence, movement, and dive behavior in order to site offshore floating wind development and conduct decommissioning activities in the Southern California Planning Area in a way that minimizes any potential impacts to these species from these activities. This information will allow for compliance with BOEM's regulatory responsibilities under the Marine Mammal Protection Act, Endangered Species Act, and National Environmental Policy Act. This information is applicable to all BOEM Programs.

Background: BOEM has funded, and is currently funding, efforts to collect seasonal data on the occurrence and distribution of cetacean (whale, dolphin, and porpoise) species (BOEM 2021a; 2021b; 2020a; 2020b; 2017; 2014a; 2014b; 1999; 1983), as well as ambient soundscape data (BOEM 2021a), within the California Current Ecosystem. These efforts provide an important baseline and large-scale context for BOEM's assessment of potential impacts to marine protected species. However, to make this information even more valuable, it is critically important to gain finer-scale, high-quality information at sufficient spatial resolution (nominal grids of 10-25 km depending on application) on whale movements, home ranges, residency times, seasonal shifts, hot spots of aggregation, and dive behaviors and relate these metrics to environmental variables such as sea surface temperature, chlorophyll-a concentrations, and seafloor depth and slope (ideally over multiple concurrent years). These data will provide a 3-D look into how large whale species in the Santa Barbara Channel area and offshore Hawai'i use their habitat. The importance of this data, presented as spatially and temporally explicit layers, cannot be overstated when considering offshore floating wind development and the identification of potential mitigative strategies to minimize any potential impacts to these species as a result of these activities, as well as the timing of future conventional energy decommissioning activities.

Oregon State University (OSU) has been collecting telemetry data for four species of baleen whales along the U.S. West Coast for the past 30 years. Additionally, in the last 3-4 years, advanced satellite tags have enabled the collection of dive behavior data. Cascadia Research Collective, MarEcoTel, and the Naval Information Warfare Center (NIWC) Pacific also have telemetry data in these areas. These data need to be collated, analyzed, and interpreted in order to be available to inform management decisions. Being the lowest cost element of this process, this represents large financial savings and large returns for BOEM.

Objective(s): The purpose of this study is to use existing telemetry data to gain a better understanding of how four large whale species (fin, blue, humpback, and gray whales) that occur off the U.S West Coast use their habitat.

Methods: The first phase of this study will focus on collating and analyzing data collected in the Santa Barbara Channel area and in areas offshore Hawai'i, with specific interest around the island of O'ahu. OSU's existing telemetry data (movement metrics and dive behavior) for fin, blue, humpback, and gray whales will be consolidated. These data will be integrated with telemetry data from Cascadia Research Collective, MarEcoTel, and NIWC for the same species. Data integrity validation will be undertaken using approved QA/QC methodologies. Data will be analyzed using state-of-the-art analytical methods to derive metrics such as residence time, home range, seasonal shifts, and hot spots of aggregation, and to relate these metrics to environmental variables (e.g., sea surface temperature, chlorophyll-a concentrations, and seafloor depth and slope). ArcGIS will be used to produce temporally and spatially explicit layers and develop an interactive visualization of the final integrated products (e.g., ArcGIS Story Map or R Shiny app) for use as a decision support tool by BOEM.

Specific Research Question(s):

1. At what rate are the whales moving?
2. What is the seasonal occupation rate in the areas of interest?
3. Are any whale species resident in the areas of interest? If so, where and for how long?
4. Can home ranges be identified for the different whale species?
5. How deep and how long do these whale species dive?

6. Does feeding occur in the areas of interest? If so, where, at what depths, and how often do they feed?
7. What is the spatial/geographic spread of the dives?
8. What are the drivers behind the identified movements/behaviors? Are the drivers biotic or abiotic?

Current Status: May 22, 2023 to September 21, 2023:

- Consolidated study areas and temporal window “seasons”, as originally described in the last quarterly report (which were based on Southall et al. 2023), for whales off the U.S. West Coast, to better inform characterization and prioritization of available tag data. The seasons follow Checkley and Barth (2009).
- Examined concentration of whale locations across study areas and seasons.
- Finalized R scripts for QA/QC and characterization of contributor tag data.
- Created R scripts for producing regularized hierarchical state-space model tracks from the contributed datasets, as input for planned gridded spatial analyses.
- Maps of important areas for focal odontocete species in Hawai‘i (insular false killer whales, insular short-finned pilot whales) were generated to help inform the study areas for this project.
- Important areas mapped for Hawai‘i included recently delineated Biologically Important Areas from Kratofil et al. (2023) and designated Critical Habitat for insular false killer whales (Critical Habitat for the Main Hawaiian Islands Insular False Killer Whale Distinct Population Segment, 2018).
- Generated figures displaying the temporal coverage of tag data for focal odontocete species in Hawai‘i.

Publications Completed: None

Affiliated WWW Sites: None

References:

[BOEM] Bureau of Ocean Energy Management. 1983. Central and Northern California Marine Mammal and Seabird Study.

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- Critical Habitat for the Main Hawaiian Islands Insular False Killer Whale Distinct Population Segment. 83 Fed. Reg. 35062 (July 24, 2018)
- Kratofil MA, Harnish AE, Mahaffy SD, Henderson EE, Bradford AL, Martin SW, Lagerquist BA, Palacios DM, Oleson EM, Baird RW. 2023. Biologically Important Areas II for cetaceans within U.S. and adjacent waters – Hawai'i Region. Front. Mar. Sci. 10:1053581. [doi: 10.3389/fmars.2023.1053581](https://doi.org/10.3389/fmars.2023.1053581)
- Southall B, Mazurek R, Eriksen R. 2023. Vulnerability Index to Scale Effects of Offshore Renewable Energy on Marine Mammals and Sea Turtles Off the U.S. West Coast (VIMMS). Camarillo (CA): US Department of the Interior, Bureau of Ocean Energy Management. Report No.: OCS Study BOEM 2023-057. 148 p. https://espis.boem.gov/Final%20Reports/BOEM_2023-057.pdf