Environmental Studies Program: Studies Development Plan | FY 2021–2022

Title	A Vulnerability Index to Scale Effects of Offshore Renewable Energy on Marine Mammals and Sea Turtles of the Pacific OCS (VIMMS)
Administered by	Pacific OCS Region
BOEM Contact(s)	Desray Reeb (desray.reeb@boem.gov)
Conducting Organization(s)	TBD
Total BOEM Cost	TBD
Performance Period	FY 2021–2022 (18 months)
Final Report Due	TBD
Date Revised	August 10, 2020
PICOC Summary	
Problem	There are currently no large-scale floating wind farms in areas of high marine mammal or sea turtle species diversity/occurrence. This makes it difficult to quantify the vulnerabilities of these species to this infrastructure.
Intervention	Assess species-specific vulnerability to offshore wind energy development using environmental context-specific factors like species population, species habitat use and compensatory abilities, potential masking and other environmental stressors.
Comparison	This analysis can be used to compare to results of complementary efforts by the State of California (i.e., California Energy Commission and Ocean Protection Council).
Outcome	This vulnerability analysis can be applied to inform the siting of offshore wind energy call and lease areas, as well as inform mitigative strategies.
Context	Central and Northern California, Washington, Oregon, and Hawai'i

BOEM Information Need(s): BOEM has already received three unsolicited applications to install floating wind turbines: one offshore Oregon and one each offshore northern and central California. While data exist on the distribution of marine mammal and sea turtle species along the west coast of the US, there is currently no collated vulnerability assessment available on which to appropriately scale the potential impacts to these species from this nascent industry. BOEM needs to acquire this information to support the environmentally responsible development of any permitted offshore renewable floating energy siting and leasing. Impact assessment information is required under the NEPA, ESA, and MMPA. This profile addresses or supports 3 of the 5 BOEM Strategic Information Needs and at least 4 of the 7 Strategic Framework Criteria for Study Development and Approval.

Background: The overarching challenge with the development of new industries or technologies is trying to anticipate their effects on the environment.

Vulnerability to effects (e.g., displacement, entanglement etc.) will vary between species because of where and when they occur along the Pacific OCS and what they are doing (migrating, feeding etc.). Species sensitivity to climate change has been discussed in the literature (Hossain et al., 2018; Dickinson et al., 2014; Foden et al., 2013) and similar approaches can be undertaken to assess the vulnerability of the different species to proposed floating wind activities in the Pacific OCS. Impacts to marine mammals and sea turtles are always of high concern to stakeholders. This study will evaluate all available and applicable Pacific marine mammal and sea turtle data and then use this information to rank each vulnerability factor (for example, species population, species habitat use and compensatory abilities, potential masking and other environmental stressors) and determine an overall potential vulnerability rating for these marine mammal and sea turtle species. This information will feed directly into BOEM's environmental assessments and decision documents and will help BOEM identify species of concern, as well as topics for future studies related to offshore floating wind impacts on marine mammals and sea turtles in the Pacific OCS.

BOEM has funded, and continues to fund, studies related to the distribution and abundance of Pacific OCS marine mammals (OCS Study #s 2019-042; 2018-044; 2018-025; 2016-035; 2014-003; Barlow et al., 2014). This study will allow for the use of the data collected from BOEM's past efforts to inform current and future decisions related to offshore renewable energy development in the Pacific OCS. Information from this study with allow for the potential avoidance of areas of high overlap with species of interest, as well as identifying potential mitigative strategies, for example, opportunities to require seasonal installation to reduce the potential for impacting certain species.

Objectives:

1. Develop a vulnerability index for marine mammals and sea turtles on the Pacific OCS, including Hawai'i.
2. Develop levels of concern (for example, a red-orange-green geospatial overlay) that could act as a basis for selection of offshore renewable energy sites.

Methods: Species vulnerability would be assessed using a trait-based approach (Foden et al., 2019; 2013; Adams et al., 2017; Laidre et al., 2008), potentially using a risk assessment framework that presents a biologically based and scientifically current process with logical elements to integrate relevant biological, acoustical, ecological, and environmental contextual variables to evaluate the significance of floating wind farm development within a marine mammal population context.

The vulnerability index will be developed by ranking key vulnerability factors including species distribution, species density estimates, species population, species population status (i.e., threatened, endangered or not), strong seasonal patterns in distribution and/or density (species habitat use), as has been done to evaluate risk to marine mammals from seismic

surveys by Southall et al. (2018) and to birds by Adams et al. (2017). The ranking of each factor for all species will be independently evaluated by a selected group of experts per factor.

Species evaluated in the index will include all marine mammal species expected to regularly occur on the Pacific OCS (Costa and Kendall, 2016). At a minimum, these will include blue, fin, humpback, gray, sperm, melon-headed and short-finned pilot whales; pan-tropical spotted, common bottlenose, rough-toothed and spinner dolphins, and harbor porpoise; monk seals, sea otters, and California sea lions. Additionally, sea turtle species expected to regularly occur on the Pacific OCS, including green, hawksbill, leatherback, loggerhead, and Olive Ridley sea turtles, will be evaluated in the index.

Specific Research Question(s):

1. Are marine mammal and sea turtle species in the Pacific OCS vulnerable to potential impacts from offshore floating wind energy development?
    a. If so, which species are most vulnerable?
    b. Where are the specific areas of vulnerability?
2. What are potential mitigations that could reduce species vulnerability/development impacts?

Current Status: Proposed

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

Adams, J., Kelsey, E.C., Felis, J.J., and Pereksta, D.M., 2017. Collision and displacement vulnerability among marine birds of the California Current System associated with offshore wind energy infrastructure (ver. 1.1, July 2017): U.S. Geological Survey Open-File Report 2016-1154, 116 p., https://doi.org/10.3133/ofr20161154.

Barlow, J., Henry. A., and Balance, L.T. 2014. 2014 California Current Cetacean & Ecosystem Assessment Survey (CalCurCEAS): final report to Bureau of Ocean Energy Management regarding surveys of Windfloat and Wave Energy Areas. Report submitted by NOAA Fisheries to the Bureau of Ocean Energy Management. April 28, 2014. https://www.boem.gov/PR-14-OBS/. 6 pg.

Costa, B.M., and Kendall, M.S. (eds.), 2016. Marine Biogeographic Assessment of the Main Hawaiian Islands. Bureau of Ocean Energy Management and National Oceanic and Atmospheric Administration. OCS Study BOEM 2016-035 and NOAA Technical Memorandum NOS NCCOS 214. 359 p.

Dickinson, M.G., Orme, C.D.L., Suttle, K.B., and Mace, G.M., 2015. Separating sensitivity from exposure in assessing extinction risk from climate change. Sci. Rep. 2015;4:6898. doi: 10.1038/srep06898.

Laidre, K.L., Stirling, I., Lowry, L.F., Wiig, O., Heide-Jorgensen, M.P., and Ferguson, S.H., 2008. Quantifying the sensitivity of arctic marine mammals to climate-induced habitat change. Ecological Applications. 18(2): 1-29, S97-S125 p.

Foden, W.B., Butchart, S.H., Stuart, S.N., Vié, J.C., Akçakaya, H.R., Angulo, A., DeVantier, L.M., Gutsche, A., Turak, E., Cao, L., Donner, S.D., Katariya, V., Bernard, R., Holland, R.A., Hughes, A.F., O'Hanlon, S.E., Garnett, S.T., Sekercioğlu, C.H., and Mace, G.M., 2013. Identifying the World's Most Climate Change Vulnerable Species: A Systematic Trait-Based Assessment of all Birds, Amphibians and Corals. PLoS One. 2013;8:e65427. doi: 10.1371/journal.pone.0065427.

Foden W.B., Young, B.E., Akçakaya, H.R., Garcia, R.A., Hoffmann, A.A., Stein, B.A., Thomas, C.D., Wheatley, C.J., Bickford, D., Carr, J.A., Hole, D.G., Martin, T.G., Pacifici, M., Pearce-Higgins, J.W., Platts, P.J., Visconti, P., Watson, J.E.M., and Huntley, B., 2018. Climate change vulnerability assessment of species. Wiley Interdiscip. Rev. Clim. Chang. 2019;10:e551. doi: 10.1002/wcc.551.

Hossain, M.A., Lahoz-Monfort, J.J., Burgman, M.A, Böhm, M., Kujala, H., and Bland, L.M., 2018. Assessing the vulnerability of freshwater crayfish to climate change. Divers. Distrib. 2018;24:1830–1843. doi: 10.1111/ddi.12831.

Southall, B.L., Amaral, J., Clark, C.W., Ellison, W., Joy, R., Tollit, D., and Pinorakis, D.W., 2018. A risk assessment framework to evaluate the potential relative effects of noise on marine mammals. Effects of Sound on Marine Mammals Conference, Den Hague, The Netherlands.