BOEM
Bureau of Ocean Energy Management

Selected BOEM-Funded Research Informing Renewable Energy Offshore Oregon

AUGUST 2023

NEW Indicates a recently started or recently completed study.

Biological Studies

Ongoing (2014–2023) — **Year-round and Diel Patterns in Habitat-use of Seabirds off Oregon**

This study by Oregon State University and the U.S. Geological Survey will provide information about the distribution, movements and behaviors of Oregon seabirds and identify patterns in their habitat use 24/7. New data collected with state-of-the-art tracking devices will be integrated with existing data to map and predict the distribution of species and their potential vulnerability to renewable energy devices.

Study Profile: https://www.boem.gov/pc-14-03

Ongoing (2016–2023) — **Analysis of Long-term Seabird Colony Legacy Data in the Pacific Northwest as a Regional Baseline**

This study by the U.S. Fish and Wildlife Service is summarizing data regarding the abundance and distribution of birds in seabird breeding colonies along the coasts of Oregon and Washington. It will provide an environmental baseline against which to evaluate potential effects of offshore energy projects on seabird colonies and populations.

Study Profile: https://www.boem.gov/pc-16-06

Ongoing (2019–2025) — **Development of Computer Simulations to Assess Entanglement Risk to Whales and Leatherback Sea Turtles in Offshore Floating Wind Turbine Moorings, Cables, and Associated Derelict Fishing Gear Offshore California**

This study, in partnership with the National Oceanic and Atmospheric Administration's National Centers for Coastal Ocean Science, has developed morphologically and behaviorally accurate 3-D computer models of protected whale species (fin and humpback) and leatherback sea turtles. Two offshore floating wind mooring system models will be integrated into simulations to visualize various potential interaction scenarios, including considering associated derelict fishing gear. The simulations will assist BOEM in assessing the risk and potential severity of entanglement, and potentially identify mitigation measures to reduce any risk.

Study Profile: https://www.boem.gov/pc-19-x07

Infographic: https://www.boem.gov/pr-19-ent-infographic

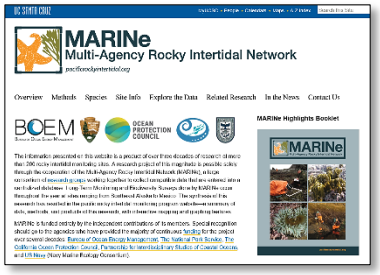
Ongoing (2019-2023) — **California Deepwater Investigations and Groundtruthing (Cal DIG) II**
This study is a partnership between BOEM, National Oceanic and Atmospheric Administration, and U.S. Geological Survey to map geologic features and characterize seafloor habitats offshore California and Oregon. It will enhance understanding about the location and nature of biologically sensitive communities, including in potential lease areas for wind energy development and areas where conventional energy is being developed.
Study Profile: https://www.boem.gov/pc-19-06

Ongoing (2020–2023) — **Over Water Migration Movements of Black Brant**
This study by the U.S. Geological Survey will increase BOEM's understanding of the temporal and spatial distribution of Black Brant offshore of the Pacific coast to evaluate potential effects of offshore wind energy development on them. BOEM's objective is to collect data on trans-oceanic and coastal migration routes for Black Brant along the Pacific coast of North America to identify their spatial location, timing, and flight altitudes. The results will help determine if the routes overlap with proposed Call Areas for wind energy off the Pacific coast.
Study Profile: https://www.boem.gov/pc-20-01-profile

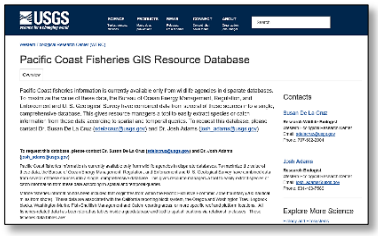
Ongoing (2020–2024) — **ADRIFT: Spatial and Temporal Distribution of Cetaceans in the California Current Ecosystem Using Drifting Archival Passive Acoustic Monitoring**
This study by the National Oceanic and Atmospheric Administration will collect and analyze passive acoustic data in the California Current Ecosystem to improve understanding of the distribution of protected cetacean (whale, dolphin, and porpoise) species, including in the vicinity of Wind Energy Areas offshore northern and central California and in a pilot study area offshore Oregon (likely in the vicinity of the Brookings Call Area for wind energy). It will employ a novel method of using drifting acoustic recorders, allowing for data to be collected over larger spatial and temporal scales compared to traditional methods. The findings will assist BOEM in assessing potential impacts and overall acoustic contribution of BOEM-regulated activities.
Study Profile: https://www.boem.gov/pc-20-04

Ongoing (2022–2026) — **Baseline Data Collection on Cetaceans and Seabirds in the Outer Continental Shelf and Slope of Northern California and Oregon to Inform Offshore Wind Energy Development**
This BOEM and U.S. Department of Energy (DOE)-funded study, which is being conducted by Oregon State University and managed by DOE, will conduct visual surveys and acoustic monitoring of marine mammals and seabirds to develop predictive density maps of species present in potential wind energy development areas offshore northern California and Oregon.
Website: https://www.energy.gov/articles/doe-announces-135-million-sustainable-development-offshore-wind

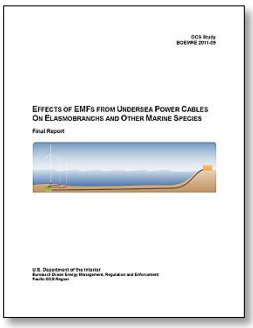
Ongoing — **BOEM-MARINe (Multi-Agency Rocky Intertidal Network)**
This long-term and continuing study by BOEM and a network of partners provides for the monitoring of rocky intertidal habitats and communities at 32 coastal sites adjacent to existing and potential OCS energy development in California and Oregon. Site-specific data about the diversity and abundance of invertebrates are housed in a publicly available database that can be used to monitor intertidal communities.
Study Profile: https://www.boem.gov/pc-19-01
MARINe Website: http://www.pacificrockyintertidal.org
MARINe Highlights: https://espis.boem.gov/final%20reports/BOEM_2020-053.pdf



Completed (2010) — **Pacific Coast Fisheries GIS Resource Database**
This study by the U.S. Geological Survey compiled marine fisheries and coastal spatial data from various wildlife agencies in California, Oregon, and Washington and integrated it into a single, comprehensive GIS-based system. The database includes information about Pacific Coast fish, fisheries, and active fishing, as well as southern California seabirds and marine mammals.
Database: https://www.usgs.gov/centers/werc/science/pacific-coast-fisheries-gis-resource-database

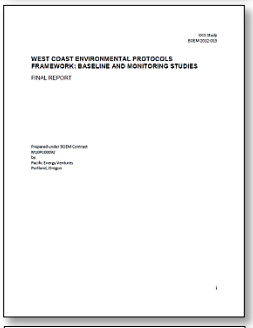


Completed (2011) — **Effects of EMF from Undersea Power Cables on Elasmobranchs and Other Marine Species**



This study by Normandeau Associates synthesized data and information about subsea power-transmission cables and the sensitivity of marine organisms to electromagnetic fields (EMF) produced by the cables. It produced a database of information about potentially affected species of elasmobranchs (sharks and rays), other fishes, marine mammals, sea turtles, and invertebrates. It also recommended future research priorities and potential mitigation measures.
Report BOEMRE 2011-09: https://espis.boem.gov/final%20reports/5115.pdf

Completed (2012) — **West Coast Environmental Protocols Framework: Baseline and Monitoring Studies**

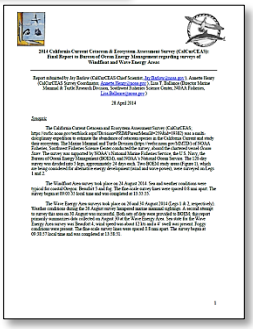


This study by Pacific Energy Ventures provides a framework for identifying natural resources and ecological issues to monitor for proposed wave, tidal, and offshore wind projects along the U.S. West Coast.
Report BOEM 2012-013: https://espis.boem.gov/final%20reports/5219.pdf

Completed (2014) — **Survey of Benthic Communities Near Potential Renewable Energy Sites Offshore the Pacific Northwest**

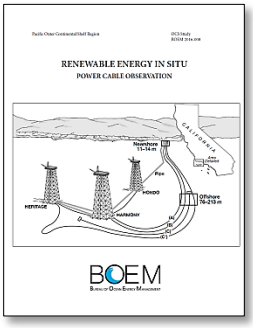
This study by Oregon State University provided baseline information about the seafloor environment and the types and distribution of benthic invertebrates in areas of potential renewable energy development on the Washington, Oregon, and northern California OCS. Knowledge of species-habitat relationships will allow for prediction of seafloor communities beyond those sampled in this study.
Report BOEM 2014-662:
Volume 1: https://espis.boem.gov/final%20reports/5453.pdf
Volume 2: https://espis.boem.gov/final%20reports/5454.pdf
Webinar: https://www.boem.gov/Science-Exchange-4

Completed (2014) — **Marine Mammal, Seabird and Ecosystem Data Collection in Pacific OCS Areas off Oregon**



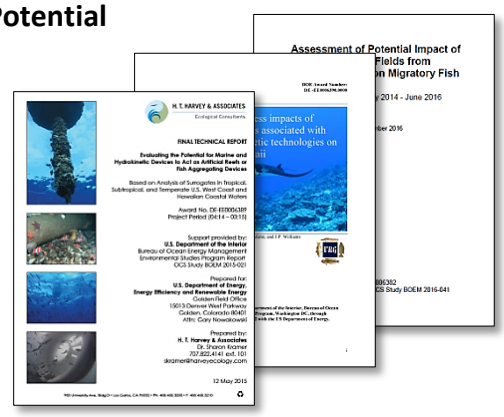
This oceanic field survey by the National Oceanic and Atmospheric Administration performed detailed observations of marine mammals, seabirds and ecosystem conditions off Oregon in August/September 2014. Specifically, these short-term, sequential surveys covered the Outer Continental Shelf (OCS) lease blocks for the Pacific Marine Energy Center South Energy Test Site (PMEC-SETS) and WindFloat Pacific, with overlapping, edge-to-edge transects. The methodology used visual, passive acoustic, water and other sampling protocols that have been used for over 10 years off the West Coast and allow for data integration and comparisons.
Synopsis: https://www.boem.gov/pr-14-obs

Completed (2016) — **Renewable Energy *in situ* Power Cable Observation**



This study by the University of California, Santa Barbara measured the strength and variability of electromagnetic fields (EMF) along subsea power transmission cables in the Santa Barbara Channel, which are similar to cables used for offshore renewable energy inter-device electrical connections. It also compared fish communities in cable versus natural habitats and determined the potential effectiveness of cable burial as a mitigation measure to decrease EMF.
Report BOEM 2016-008: https://espis.boem.gov/final%20reports/5520.pdf
Webinar: https://www.boem.gov/Science-Exchange-3

Completed (2016) — **Using Ongoing Activities as Surrogates to Predict Potential Ecological Impacts from Marine Renewable Energy**



BOEM and the U.S. Department of Energy partnered on this study to identify and analyze data from ongoing projects and activities (surrogates) with stressors and receptors similar to those expected from marine renewable energy projects. Two reports examined potential impacts of electromagnetic fields from operating power cables, and one examined mooring configurations of offshore surrogates such as aquaculture facilities and oceanographic buoys as fish attracting devices.

Reports:

BOEM 2015-021: https://www.boem.gov/2015-021

BOEM 2015-042: https://www.boem.gov/2015-042

BOEM 2016-041: https://www.boem.gov/2016-041

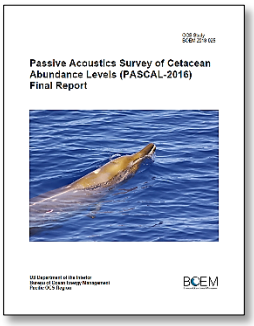
Completed (2016) — **Developing and Applying a Vulnerability Index for Scaling the Possible Adverse Effects of Offshore Renewable Energy Projects on Seabirds on the Pacific OCS**

This BOEM-directed study, conducted and primarily funded by the U.S. Geological Survey, developed a comprehensive database to evaluate 81 marine bird species in the California Current System (CCS) in terms of their collision and displacement vulnerability from offshore wind energy infrastructure. It used existing and newly analyzed at-sea behavioral information (e.g., avian habits and activities, flight-height, and flight characteristics) and population metrics to identify species-specific vulnerabilities at the population level. The vulnerability assessment results can now be combined with recent marine bird at-sea distribution and abundance data for the CCS to help address seabird conservation during the siting and operation of offshore wind energy development projects.

Report BOEM 2016-043 (USGS Open-File Report 2016-1154): https://pubs.er.usgs.gov/publication/ofr20161154

Webinar: https://www.boem.gov/Science-Exchange-6

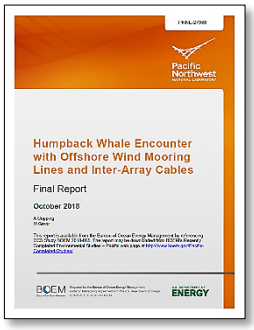
Completed (2018) — **California Current Cetacean and Ecosystem Assessment Survey and Use of Data to Produce and Validate Cetacean and Seabird Density Maps**

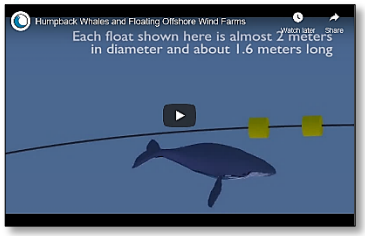


This study by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service Southwest Fisheries Science Center focused on listening for whale species that are difficult to detect during visual surveys because of their deep diving habits and and limited surface activity.

Report BOEM 2018-025: https://espis.boem.gov/final%20reports/BOEM_2018-025.pdf

Completed (2018) — **Humpback Whale Encounter with Offshore Wind Mooring Lines and Inter-Array Cables**



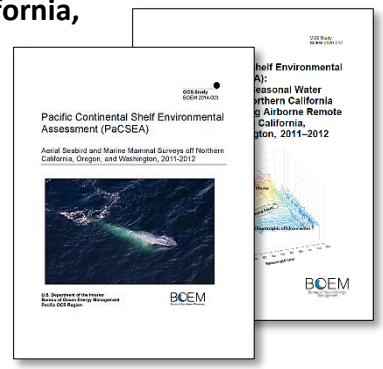


This study by the U.S. Department of Energy's Pacific Northwest National Laboratory compiled information about whale movements (e.g., dive depths and swimming speed) and created a three-dimensional video animation of how whales may move through a hypothetical offshore floating wind farm. This visual simulation will help characterize the risk of whale encounters with mooring lines and electrical cables used in offshore floating wind projects.

Report BOEM 2018-065: https://www.boem.gov/BOEM-2018-065

Video Animation: https://www.boem.gov/humpback-whales-floating-wind

Completed (2020) — **Seabird and Marine Mammal Surveys off the Northern California, Oregon and Washington Coasts**



This study by the U.S. Geological Survey and U.S. Fish and Wildlife Service provided up-to-date information on the types, distribution, abundance, seasonal variation, and habitat use of marine mammals and seabirds along the northern California, Oregon, and Washington coasts. Aerial surveys using state-of-the-art technology focused on the most likely areas of OCS renewable energy development. Additional work determined ecosystem connections and species-habitat associations.

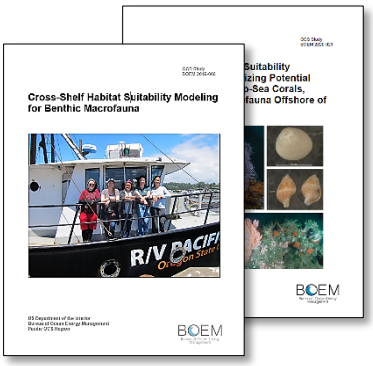
Reports:

BOEM 2014-003: https://espis.boem.gov/final%20reports/5427.pdf

BOEM 2020-012: https://espis.boem.gov/final%20reports/BOEM_2020-012.pdf

Webinar: https://www.boem.gov/Science-Exchange-1

Completed (2020) — **Cross-Shelf Habitat Suitability Modeling**



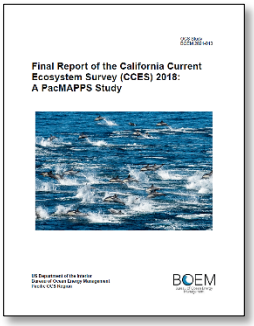
This study by the National Oceanic and Atmospheric Administration and Oregon State University created two new habitat suitability models for deep water corals, sponges, and soft-sediment macrofaunal species offshore the U.S. West Coast. These habitat suitability models extend across the continental shelf and out to 1200 meter depth. This study included field validations and comparisons with previous models, and improves the predictive capabilities of important seafloor habitats and benthic communities.

Reports:

BOEM 2020-008: https://espis.boem.gov/final%20reports/BOEM_2020-008.pdf

BOEM 2020-021: https://espis.boem.gov/final%20reports/BOEM_2020-021.pdf

Completed (2021) — **Pacific Marine Assessment Partnership for Protected Species (PacMAPPS) – California Current**



This study was a partnership between BOEM, the National Marine Fisheries Service, and the U.S. Navy to conduct shipboard surveys of marine mammals, seabirds, and, to the extent possible, sea turtles in the Pacific. The data collected during a 2018 survey of the California Current Ecosystem (Baja California, California, Oregon, and Washington) will help BOEM evaluate potential effects of proposed energy activities on protected species, that includes an ecosystem-level context, including in areas of interest for renewable energy development (California, Oregon) and for conventional energy decommissioning (California).

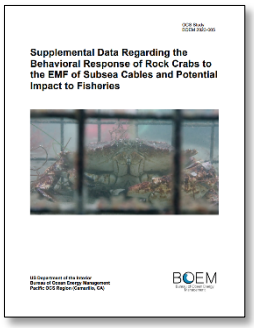
Report BOEM 2021-013: https://espis.boem.gov/final%20reports/BOEM_2021-013.pdf

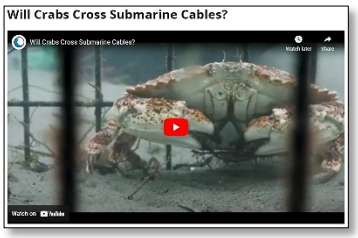
Completed (2021) — **Data Synthesis and High-resolution Predictive Modeling of Marine Bird Spatial Distributions on the Pacific OCS**

This study by the National Oceanic and Atmospheric Administration and U.S. Geological Survey synthesized 50 years of seabird survey data off California, Oregon, and Washington, and combined it with information about environmental and oceanographic conditions to predict the occurrence and abundance of seabirds at sea. The resulting predictive maps of seabird distributions will provide critical information for renewable energy siting and evaluation of potential environmental effects of management actions and project approvals.

Report BOEM 2021-014: https://espis.boem.gov/final%20reports/BOEM_2021-014.pdf

NEW ***Completed (2023) —*** **Supplemental Data Regarding the Behavioral Response of Rock Crabs to the EMF of Subsea Cables and Potential Impact to Fisheries**





This study by Occidental College used existing AC subsea cables (34.5 kV) to test whether the electromagnetic field (EMF) produced by power transmission affected the behavior of red rock crabs, a species fished commercially. The presence of a magnetic field did not affect the propensity of crabs to enter baited traps. This effort augmented an earlier study published by the University of California, Santa Barbara with additional experimental evidence.
Report BOEM 2023-005: https://espis.boem.gov/final%20reports/BOEM_2023-005.pdf
Video: https://www.boem.gov/newsroom/will-crabs-cross-submarine-cables

NEW ***Completed (2023) —*** **A Vulnerability Index to Scale Effects of Offshore Renewable Energy on Marine Mammals and Sea Turtles of the U.S. West Coast (VIMMS)**

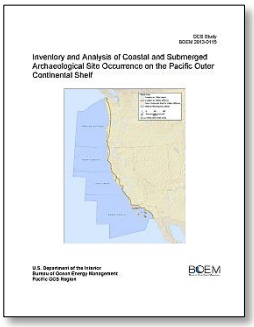
This study by Southall Environmental Associates (SEA), Inc. developed a vulnerability index based on the best available data and expert elicitation for marine mammals and sea turtles that occur offshore central and northern California, Oregon, and Washington. The index will assist in scaling the effects and prioritizing which of these species need to be considered in assessments of risk from offshore renewable energy infrastructure. It developed a visual representation of the levels of concern for relevant species or species groups, which will also inform the selection of renewable energy sites.
Study Profile: https://www.boem.gov/pc-21-04
Report: in press

Cultural & Archaeological Studies

Ongoing (2021–2025) — **West Coast Tribal Cultural Landscapes**

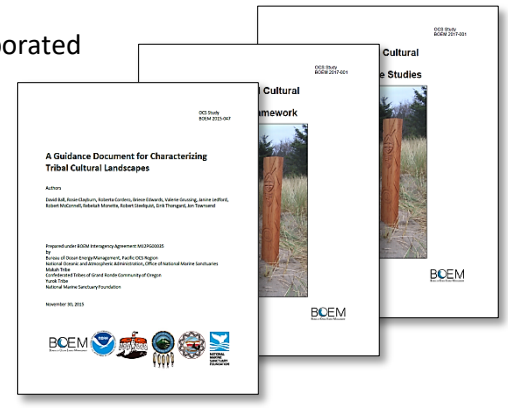
This effort by the Udall Foundation's John S. McCain III National Center for Environmental Conflict Resolution will work with interested West Coast Tribal Nations to develop cultural landscape assessments along the coast and offshore California, Oregon, and Washington near areas of potential offshore wind energy development. It will improve understanding about cultural and archaeological resources and places of importance, and assist in understanding potential impacts of offshore renewable energy development.
Study Profile: https://www.boem.gov/pc-21-01

Completed (2013) — **Inventory and Analysis of Coastal and Submerged Archaeological Site Occurrence on the Pacific OCS**



This study by ICF International assessed the potential for submerged prehistoric sites on the California, Oregon, and Washington Outer Continental Shelf (OCS), and identified coastal properties and significant coastal cultural resources subject to potential visual impacts from offshore energy development. It also produced a proprietary inventory of known, reported, and potential historic shipwrecks.
Report BOEM 2013-0115: https://espis.boem.gov/final%20reports/5357.pdf

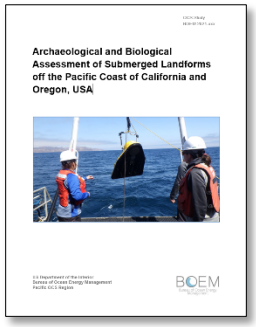
Completed (2017) — **Characterizing Tribal Cultural Landscapes**



This effort, led by the National Oceanic and Atmospheric Administration, collaborated with the Yurok Tribe of California, Grand Ronde Tribe of Oregon, and Makah Tribe of Washington to develop best practices for consultation through implementation of a cultural landscape approach. Each Tribe employed this approach to develop their own unique case studies. This information will likely be important to future consideration of marine renewable energy projects.

Reports:
BOEM 2015-047 (Guidance Document): https://www.boem.gov/2015-047
BOEM 2017-001:
Volume I: https://www.boem.gov/BOEM-2017-001-volume-1
Volume II: https://www.boem.gov/BOEM-2017-001-volume-2
Webinar: https://www.boem.gov/Science-Exchange-8

Completed (2021) — **Archaeological and Biological Assessment of Submerged Landforms off the Pacific Coast of California and Oregon, USA**



To better understand the potential for submerged pre-contact archaeological sites on the Pacific OCS, researchers from San Diego State University and a variety of other academic and government institutions employed terrestrial analogues, paleoshoreline mapping, sediment coring, ground-truthing techniques, and biological assessments to explore potential intact submerged geological landforms offshore California's Northern Channel Islands and central Oregon. This study produced a large dataset and a GIS-based model to predict where intact submerged landforms features may be located on the Pacific OCS.

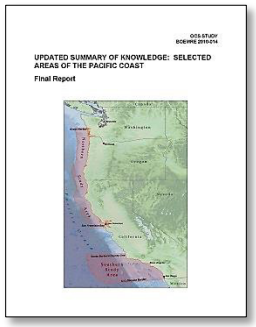
Report: in press

Information Synthesis Studies

Ongoing (2022–2023) — **Oregon Offshore Wind Suitability Modeling and Cluster Analysis**

This study is a collaboration between BOEM and the National Oceanic and Atmospheric Administration's National Centers for Coastal Ocean Science to conduct a suitability analysis of the Coos Bay and Brookings Call Areas for wind energy to help inform BOEM's Area Identification process offshore Oregon. The analysis involves (1) creating a comprehensive inventory of spatial datasets, (2) evaluating the datasets for relevance to offshore wind planning, (3) creating constraint layers, (4) running iterations of suitability models based on different scenarios, and (5) running a cluster analysis to create 1 GW areas of minimum conflict.

Completed (2010) — **Updated Summary of Knowledge: Selected Areas of the Pacific Coast**



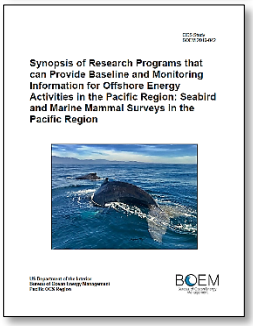
This study by Mangi Environmental Group compiled and analyzed information generated after 1977 about the coastal and marine environment from Grays Harbor, Washington to San Francisco Bay, and from Santa Barbara County to the U.S.-Mexico border. It identified early information and data gaps about oceanographic resources and potential impacts of offshore renewable energy development.

Report BOEMRE 2010-014: https://espis.boem.gov/final%20reports/4955.pdf

Completed (2013) — **Oregon Marine Renewable Energy Environmental Science Conference**

This conference – coordinated by and held at Oregon State University, Corvallis – brought together an international group (including 40 Oregon specialists) to review existing and ongoing science pertinent to marine renewable energy. This expert group reviewed existing research and prioritized data gaps and needs for baseline conditions, environmental effects, and monitoring studies.
Report BOEM 2013-0113: https://espis.boem.gov/final%20reports/5255.pdf

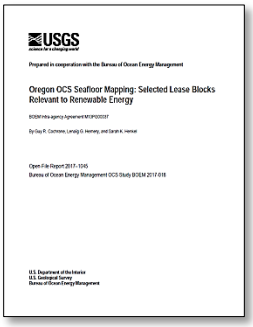
Completed (2019) — **Synopsis of Research Programs that can Provide Baseline and Monitoring Information for Offshore Energy Activities in the Pacific Region**



This study by the U.S. Geological Survey identified research programs that have produced databases containing information on species and habitats sensitive to offshore energy activities in the Pacific Region. It evaluated the capability of these programs to provide baseline and monitoring data to understand and mitigate potential impacts of conventional energy development offshore southern California and renewable energy development offshore southern California, Oregon, Washington, and Hawaii.
Report BOEM 2019-042: https://www.boem.gov/2019-042

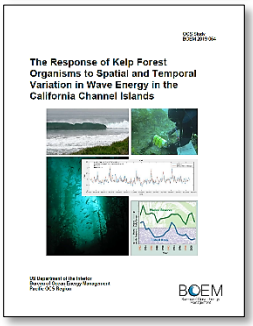
Physical Oceanography & Geology Studies

Completed (2017) — **Oregon OCS Seafloor Mapping: Selected Lease Blocks Relevant to Renewable Energy**



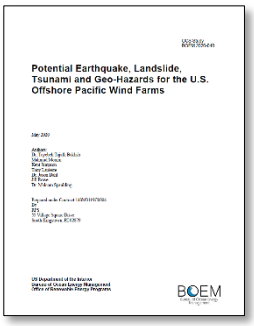
This study by the U.S. Geological Survey collected high-resolution, multibeam seafloor data of the potential Outer Continental Shelf (OCS) lease area offshore Coos Bay, Oregon. The data were used to develop comprehensive maps of seafloor habitats and geology, which are needed to address site-specific siting, ecosystem assessments and geohazards.
Report BOEM 2017-018 (USGS Open-File Report 2017-1045): https://www.boem.gov/2017-018

Completed (2019) — **Predicting the Consequences of Wave Energy Absorption from Marine Renewable Energy Facilities on Nearshore Ecosystems**



By calibrating a regional wave model with site-specific wave measurements and site-specific biological data (30+ year time series from the National Park Service and the U.S. Geological Survey offshore southern California), this study developed a statistical model to predict the potential effects of wave energy absorption from marine renewable energy facilities on nearshore ecosystems, especially giant kelp forests. The study found that wave energy had a significant effect on several species. But for most taxa (36/57), density was unrelated to waves. Even for those species with a statistical relationship between density and wave energy, a 15% reduction in wave height would not have a detectable effect on the density of any species.
Report BOEM 2019-064: https://espis.boem.gov/final%20reports/BOEM_2019-064.pdf

Completed (2020) — **Potential Earthquake, Landslide, Tsunami and Geo-Hazards on the U.S. Offshore Pacific Wind Farms**



Floating offshore wind (FOW) construction and operation on the U.S. West Coast may face the risk of potential geohazards, as they are relatively new applications of older technologies (land-based wind and mobile offshore drilling units) in tectonically active regions. Seismic activities, landslides, and tsunamigenic earthquakes are threats to the U.S. West Coast and Hawaii, and uncertainty exists over how FOW development and siting will be impacted by these threats in proposed areas of development. This study provided both a general evaluation of geohazards for floating wind areas already designated as potential lease sites and developed design considerations and criteria for structures to cope with extreme events.
Report BOEM 2020-040: https://www.boem.gov/environment/final-report-geohazards
Web Map Interface: http://boem-oceansmap.s3-website-us-east-1.amazonaws.com

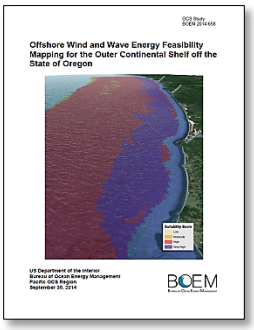
---

Resource, Technology & Infrastructure Studies

Ongoing (2022–2024) — **West Coast Offshore Wind Power Flows**

This study by the U.S. Department of Energy's Pacific Northwest National Laboratory seeks to identify the constraints and opportunities for Oregon and California offshore wind power to flow to the San Francisco area. Three transmission scenarios will be compared to understand how the interconnection design influences the dispatch of offshore wind and other power plants. The transmission scenarios may include (1) direct, radial interconnection of each offshore wind farm into the land-based grid, (2) a coordinated interconnection process where multiple wind farms use a single interconnection point, or (3) a coordinated subsea HVDC cable that interconnects to the San Francisco Bay Area and potentially other coastal locations.

Completed (2014) — **Industry Feasibility Mapping for the Outer Continental Shelf off the State of Oregon**

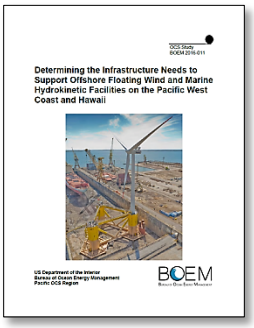


This study by the U.S. Department of Energy's Pacific Northwest National Laboratory developed maps and other spatially explicit products to identify general areas where it may be technologically and economically feasible to site renewable energy devices on the Oregon Outer Continental Shelf (OCS). It examined the latest industry technologies for offshore wind and wave energy for the Oregon OCS.
Report BOEM 2014-658: https://www.boem.gov/2014-658

Completed (2015) — **Pacific Offshore Time Series Wind Resource Analysis**

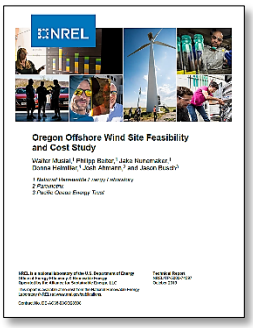
This study by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) addressed time-series analysis of wind speed data along the coasts of Washington, Oregon, California, and Hawaii, scaled to BOEM's aliquot grid (a unit of leasing). Average wind speed was provided by month, by hours of the day, and for a long-term (17-year) time series. These and other offshore wind resource datasets are available via the Open Energy Data Initiative.
Data: https://dx.doi.org/10.25984/1821404

Completed (2016) — **Determining the Infrastructure Needs to Support Offshore Floating Wind and Marine Hydrokinetic Facilities on the Pacific West Coast and Hawaii**



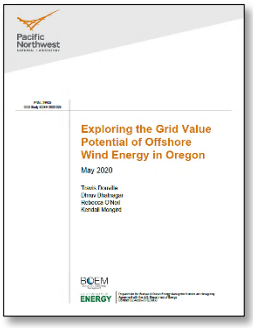
This study by ICF International evaluated the current infrastructure and vessel requirements and capabilities existing on the Pacific West Coast of the U.S. and the Hawaiian islands of Oahu, Maui, and Kauai to support the burgeoning offshore renewable energy industry. Understanding the infrastructure needs of the offshore renewable industry will help to identify the port-related requirements for offshore floating wind development and marine hydrokinetic industries and assess the utilization of the available marine equipment and facilities along the U.S. West Coast.
Report BOEM 2016-011: https://espis.boem.gov/final%20reports/5503.pdf

Completed (2019) — **Oregon Offshore Wind Site Feasibility and Cost Study**



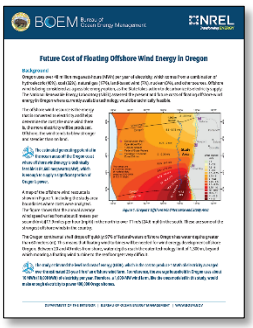
This study by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) assessed the present and future costs of floating offshore wind technology deployment at five reference sites in the state of Oregon at commercial scale. The study builds off a 2016 NREL report assessing floating offshore wind costs in California. The Oregon study includes floating offshore wind technology advancement since the California study, recent European and U.S. market data, and cost differences between floating and fixed-bottom offshore wind foundations. The study provides the state of Oregon with site analysis and cost data to allow for consideration of floating offshore wind in the state's future energy portfolio. (Note: An updated cost study was completed in 2021; see Oregon Floating Offshore Wind Cost Modeling.)
Report BOEM 2019-046: https://www.boem.gov/BOEM-2019-046

Completed (2020) — **Exploring the Grid Value Potential of Offshore Wind Energy in Oregon**



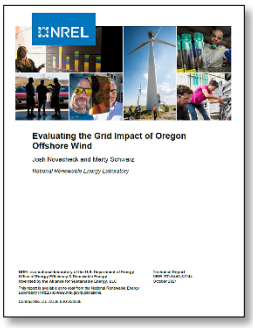
This study by the U.S. Department of Energy's Pacific Northwest National Laboratory broadly characterized the value that Oregon offshore wind energy may convey to the electric grid. Three types of grid value potential were considered: (1) resource complementarity, or the inherent time correlation of Oregon offshore wind resources to existing energy resources, (2) load (i.e., demand) complementarity as measured across the four Balancing Authorities in Oregon, and (3) locational value to support coastal grids and increase regional grid reliability. Benefits to regional transmission networks were quantified through a production cost model and capacity contributions were discussed.
Report BOEM 2020-026: https://www.boem.gov/BOEM-2020-026
Summary Presentation: https://www.boem.gov/BOEM-2020-026-Presentation

Completed (2021) — **Oregon Floating Offshore Wind Cost Modeling**



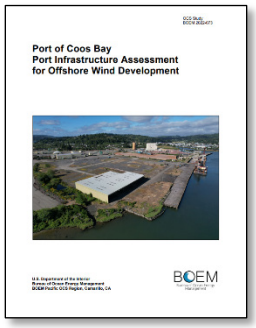
This study by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) developed maps showing updated estimates of the levelized cost of energy (LCOE) for floating offshore wind off the coast of Oregon. The study builds upon NREL's assessments of floating offshore wind costs offshore Oregon (2019) and California (2020), and includes updated floating wind cost data, modeling methodology, and wind resource data since the 2019 Oregon study (see Oregon Offshore Wind Site Feasibility and Cost Study).
Fact Sheet: https://www.boem.gov/pr-20-owc-fact-sheet
Presentation: https://www.boem.gov/pr-20-owc-presentation

Completed (2021) — **Evaluating the Grid Impact of Oregon Offshore Wind**



This study by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) comprehensively assessed the potential value of offshore wind energy to the Oregon power system, specifically as a possible non-wires alternative for the electric grid. The study team (1) developed scenarios for potential offshore wind deployment in the context of the Oregon power generation and transmission landscape, (2) modeled offshore wind power generation at high spatial and temporal resolution, and (3) assessed key potential grid benefits and challenges for the deployment scenarios via NREL's production cost models.
Report BOEM 2021-064: https://www.boem.gov/BOEM-2021-064

Completed (2022) — **Port of Coos Bay Infrastructure Assessment for Offshore Wind Development**



This study by Moffatt & Nichol identified the modifications, improvements, or upgrades that would be needed for the Port of Coos Bay to support floating offshore wind development. It assessed the current capabilities and currently planned major projects of the Port and developed a basis of analysis to determine the requirements of the Port under different scenarios that would be needed to enable floating offshore wind development from the Port. A high-level cost estimate for the Port improvements that could be used to inform a site feasibility study is included in the assessment.
Report BOEM 2022-073: https://www.boem.gov/BOEM-2022-073

Socioeconomic Studies

Ongoing (2022–2025) — **Social Values, Perceptions, and Likelihood of Social Action in Potential Wind Energy Areas in the Pacific Outer Continental Shelf Region**

This study by the National Oceanic and Atmospheric Administration's National Centers for Coastal Ocean Science will collect information about the demographics of stakeholders and their communities in areas potentially affected by wind energy development offshore Oregon, and the levels of awareness and perceptions of different stakeholder groups to offshore wind energy development. It will also identify how stakeholders view the potential benefits and impacts of offshore wind energy development, which communities may favor or be opposed to such development, and which communities may be more or less likely to engage in social action for or against such development.
Study Profile: https://www.boem.gov/pc-22-06

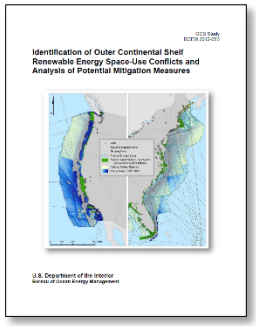
Ongoing (2022–2023) — **Socioeconomic Characterization of West Coast Fisheries in Relation to Offshore Wind Development**

This study by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service Northwest Fisheries Science Center is developing products that will help BOEM characterize West Coast fishing communities, including supportive industries (primary and secondary/ancillary markets), fishing-related infrastructure, fishing sector interconnections, and potential connections between fishing sectors and wind energy development offshore the West Coast. This information will further BOEM's understanding of West Coast fisheries; it will also be used to support NEPA and other analyses, and inform BOEM's decision-making throughout its planning process and construction and operation of offshore wind on the West Coast.
Study Profile: https://www.boem.gov/pr-22-soc

Ongoing (2022–2023) — **Oregon Offshore Wind Visual Simulation**

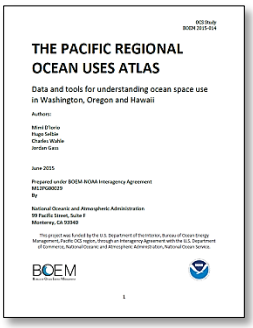
This study by Truescape is conducting visual simulations of hypothetical offshore wind projects within the Coos Bay and Brookings Call Areas for wind energy to help inform BOEM's Area Identification process offshore Oregon. The goal of the study is to provide BOEM with spatially accurate and realistic visual simulations in areas where the coastline contains natural areas, lighthouses, beaches, and other public spaces with viewsheds that include the Call Areas, as well as offshore and coastal areas of significance to Native Americans.

Completed (2012) — **Identification of Outer Continental Shelf Renewable Energy Space-Use Conflicts and Analysis of Potential Mitigation Measures**



This study by Industrial Economics, Incorporated captured baseline space-use information on the Atlantic and Pacific Coasts; the Pacific study area included federal waters offshore Washington, Oregon, and northern California. It collected data on more than a dozen space uses (including commercial fishing and shipping), identified potential and known conflicts that may arise with renewable energy development, and provided insights on potential mitigation and avoidance measures.
Report BOEM 2012-083: https://espis.boem.gov/final%20reports/5203.pdf

Completed (2015) — **Pacific Regional Ocean Uses Atlas**



This partnership between BOEM and the National Oceanic and Atmospheric Administration documented patterns of existing and emerging ocean uses in OCS areas off the states of Washington, Oregon, and Hawaii through participatory mapping workshops. The project also identified potential areas of conflict and/or compatibility between proposed renewable energy areas and other ocean uses. The atlas documents a full range of human activities and sectors in the ocean to support offshore renewable energy planning.

Report BOEM 2015-014: https://www.boem.gov/2015-014

Project Information: https://marinecadastre.gov/oceanuses

Completed (2015) — **Economic Impact from Large-Scale Deployment of Offshore Marine and Hydrokinetic Technology in Oregon**

This study by the U.S. Department of Energy's National Renewable Energy Laboratory conducted an analysis of the potential economic impacts of deploying wave energy conversion devices off the coast of Oregon. It examined multiple deployment scenarios to estimate economic impacts for the entire state and Oregon's coastal counties.

Reports:

BOEM 2014-664: https://www.boem.gov/2014-664

BOEM 2015-018: https://www.boem.gov/BOEM-2015-018

Jobs and Economic Development Impact Marine and Hydrokinetic Models Website: https://www.nrel.gov/analysis/jedi/marine-hydro.html

Completed (2016) — **Floating Offshore Wind in Oregon: Potential for Jobs and Economic Impacts from Two Future Scenarios**

This study by the U.S. Department of Energy's National Renewable Energy Laboratory conducted an analysis of potential employment and economic impacts of large-scale floating offshore wind off the coast of Oregon. It examined two deployment scenarios to estimate impacts for the entire state and Oregon's coastal counties.

Reports:

BOEM 2016-030: https://www.boem.gov/2016-030

BOEM 2016-031: https://www.boem.gov/2016-031

Jobs and Economic Development Impact Wind Models Website: https://www.nrel.gov/analysis/jedi/wind.html

Other Studies Informing OCS Renewable Energy (not specific to Oregon)

BOEM 2017-057 **Phased Approaches to Offshore Wind Development and Use of the Project Design Envelope** *https://www.boem.gov/Phased-Approaches-to-Offshore-Wind-Developments-and-Use-of-Project-Design-Envelope*

BOEM 2018-053 **Impact Assessment and Mitigation of Offshore Wind Turbines on High Frequency Coastal Oceanographic Radar** *https://espis.boem.gov/final%20reports/BOEM_2018-053.pdf*

BOEM 2018-057 **Metocean Characterization Recommended Practices for U.S. Offshore Wind Energy** *https://www.boem.gov/Metocean-Recommended-Practices*

BOEM 2020-039 **Radar Interference Analysis for Renewable Energy Facilities on the Atlantic Outer Continental Shelf** *https://www.boem.gov/environment/radar-interferance-atlantic-offshore-wind0pdf*

BOEM 2021-030 **Floating Offshore Wind Turbine Development Assessment** *https://www.boem.gov/renewable-energy/studies/study-number-deliverable-4-final-report-technical-summary*

BOEM 2021-032 **Assessment of Seascape, Landscape, and Visual Impacts of Offshore Wind Energy Developments on the Outer Continental Shelf of the United States** *https://www.boem.gov/environment/environmental-studies/boem-2021-032*

BOEM 2021-053 **Comparison of Environmental Effects from Different Offshore Wind Turbine Foundations** *https://www.boem.gov/environment/wind-turbine-foundations-white-paper-final-white-paper*

For more information about BOEM-funded research:

Environmental Studies Program: https://www.boem.gov/environment/how-we-do-research

Environmental Studies Program Hub: https://www.boem.gov/environment/environmental-studies/environmental-studies-information

Pacific OCS Environmental Studies: https://www.boem.gov/Pacific-Studies

Renewable Energy Research: https://www.boem.gov/environment/environmental-studies/renewable-energy-research

BOEM Activities in Oregon: https://www.boem.gov/Oregon