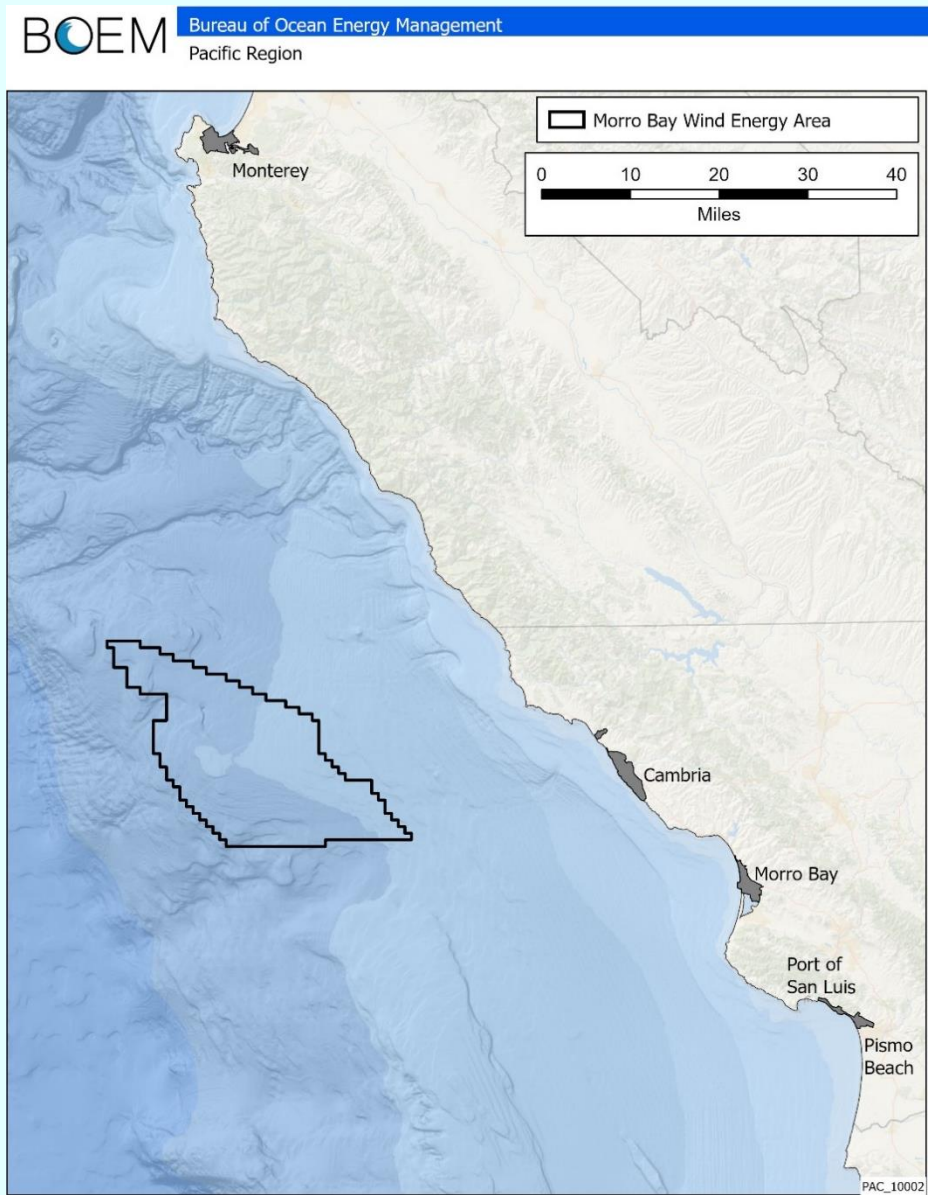


DRAFT ENVIRONMENTAL ASSESSMENT

Commercial Wind Lease and Grant Issuance and Site Assessment Activities
on the Pacific Outer Continental Shelf,
Morro Bay Wind Energy Area, California



April 2022

Commercial Wind Lease and Grant Issuance and Site Assessment Activities on the Pacific Continental Shelf

Morro Bay Wind Energy Area, California

Draft Environmental Assessment

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Abbreviations and Acronyms

ac	acres
ADCP	acoustic doppler current profilers
Area ID	Area Identification
BIA	biologically important areas
BOEM	Bureau of Ocean Energy management
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CHIRP	compressed high intensity radar pulse
CO	carbon monoxide
CO ₂	carbon dioxide
COLOS	Coastal Oceanographic Line-of-Sight
COP	Construction and Operations Plan
cSEL	cumulative sound exposure level
CWA	Clean Water Act
dB	decibels
EA	Environmental Assessment
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FLiDAR	floating light detection and ranging
ft	foot/feet
G&G	geological and geophysical
GDP	Gross Domestic Product
HAPC	Habitat of Particular Concern
HRG	high-resolution geophysical
Hz	hertz
IPF	impact-producing factors
kg	kilograms
kHz	kilohertz
km	kilometers
km ²	square kilometers
Kn	knots
lbs	pounds
LEP	Limited English Proficiency
μPa	micropascal
m	meter(s)
m ²	square meters
MBPC	Morro Bay Port Complex

mi	miles
mi ²	square miles
MWh	megawatt hours
NA	not applicable
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
nmi	nautical miles
NO ₂	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOMAD	Naval Oceanographic and Meteorological Automated Devices
NTL	Notice to Lessees
NRHP	National Register of Historic Places
m/s	meters per second
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
PA	Programmatic Agreement
PCB	polychlorinated biphenyls
PFMC	Pacific Fishery Management Council
PM	particulate matter
PNNL	Pacific Northwest National Laboratory
PTS	Permanent Threshold Shift
RMS	root mean square
ROW	right-of-way
RUE	Rights-of-use and easement
SAP	Site Assessment Plan
SEL	sound exposure level
SO ₂	sulfur dioxide
SOC	State of California
TSS	Traffic Separation Schemes
TTS	Temporary Threshold Shift
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VGP	Vessel General Permit
WEA	Wind Energy Area

1 Purpose and Need for the Proposed Action

The U.S. Department of the Interior’s Bureau of Ocean Energy Management (BOEM) prepared this environmental assessment (EA) to determine whether the issuance of a lease and grants within the Wind Energy Area (WEA) in Morro Bay would lead to reasonably foreseeable significant impacts on the environment and, thus, whether an environmental impact statement should be prepared before a lease is issued (Figure 1-1).

The purpose of the Proposed Action is to issue up to 3 commercial renewable energy leases within the WEA and grant rights-of-way (ROWs) and rights-of-use and easements (RUEs) in the region of the Outer Continental Shelf (OCS) of central California. BOEM’s issuance of these leases and granting of ROWs and RUEs is needed to (a) confer the exclusive right to submit Site Assessment Plans (SAPs) to BOEM for potential development such that the lessees and grantees develop plans for BOEM’s review and will commit to site characterization and site assessment activities necessary to determine the suitability of their leases, easements, and ROWs for commercial offshore wind production and/or transmission and (b) ensure that site characterization and assessment activities are conducted in a safe and environmentally responsible manner. The issuance of a lease by BOEM to the lessee conveys no right to proceed with development of a wind energy facility; the lessee acquires only the exclusive right to submit a plan to conduct this activity.

On November 10, 2021, BOEM released the Announcement of Area Identification (Area ID) Memorandum (Appendix A). The Memorandum documents the analysis and rationale in support of the recommended designation of a WEA offshore Morro Bay, California for environmental analysis and consideration for leasing. The Morro Bay Call Area was identified in the Call for Information and Nominations (Call) published on October 19, 2018, and two extensions published on July 29, 2021. The Morro Bay WEA is approximately 240,898 total acres (ac), (376 square miles) and located approximately 20 miles from shore. Water depths across the WEA range from approximately 900 and 1,300 meters (m) (2,953–4,265 (ft)) (Table 1-1).

Table 1-1: Recommended Morro Bay Wind Energy Area Descriptive Statistics

Acres	Installation Capacity ¹	Homes powered ²	Power Production (MWh/year): 40% Capacity Factor ³	Power Production (MWh/year): 60% Capacity Factor ⁴	Maximum Depth (meters)	Minimum Depth (meters)
240,898	2,924	1,023,623	10,245,696	15,368,544	1300	900

Notes:

- ¹ Megawatts (MW) based upon 3 MW/km²
- ² Homes powered based upon 350 homes per MW
- ³ Formula = Capacity (MW) x 8,760 (hrs/yr) x 0.4 (capacity factor)
- ⁴ Formula = Capacity (MW) x 8,760 (hrs/yr) x 0.6 (capacity factor)

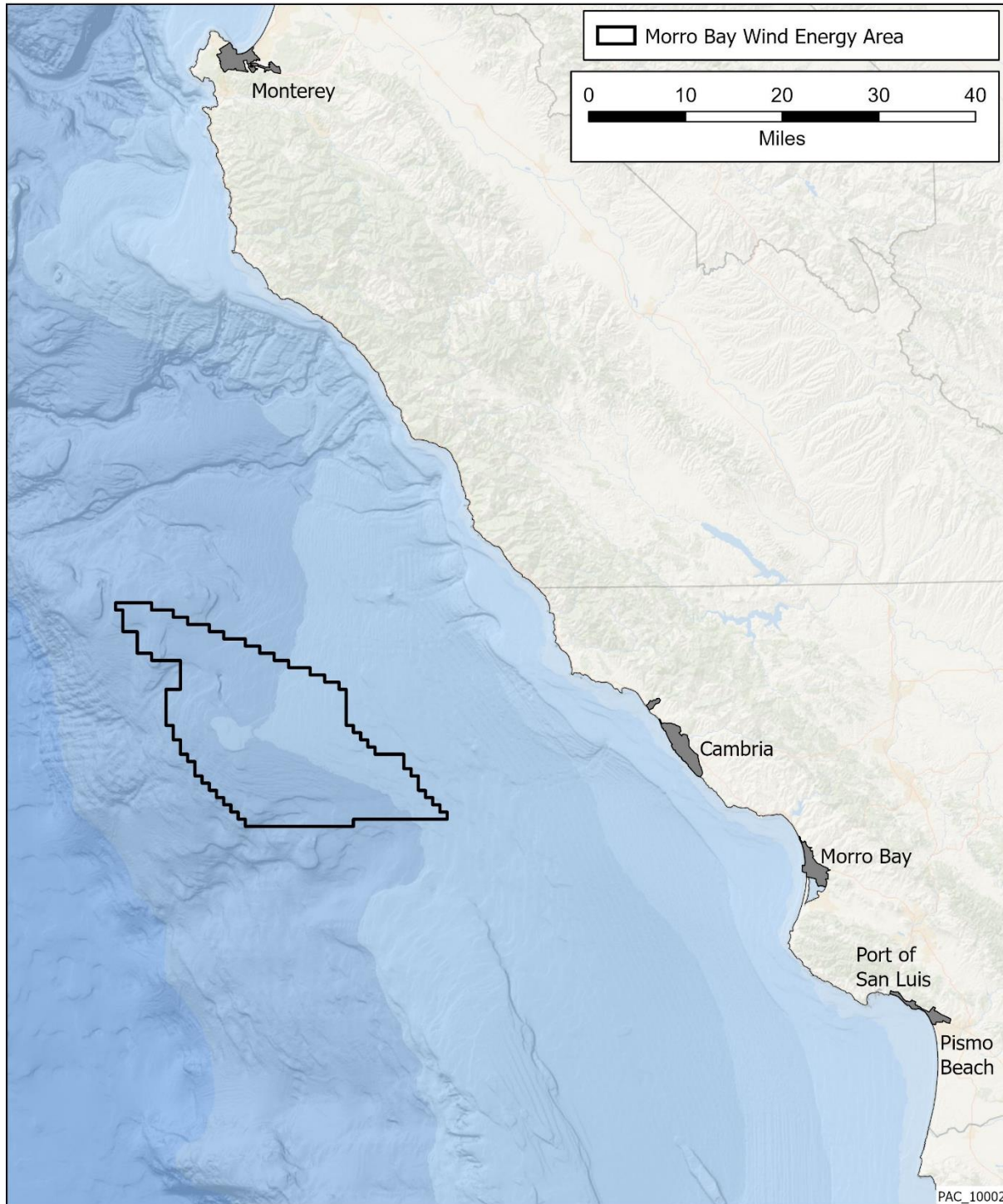


Figure 1-1: Map of Morro Bay Wind Energy Area offshore California

2 Alternatives – Proposed Action and No Action

2.1 Proposed Action

The Proposed Action for this EA is the issuance of commercial wind energy leases and associated easements within the WEA that BOEM designated on the OCS in the vicinity of San Luis Obispo County, California. This EA analyzes BOEM's issuance of 1-3 leases within the Morro Bay WEA, as well as the issuance of easements and grants associated with each lease for subsea cable corridors and areas for associated offshore collector/converter platforms. The ROWs and RUEs would all be located within the California OCS, extending from the WEA through to state waters and to the onshore energy grid. Site assessment activities and site characterization activities focused within the leases and easements are expected to take place after lease issuance. A lessee would submit a SAP to describe site assessment activities for BOEM's review (30 Code of Federal Regulations (CFR) 585.605-613). Site assessment activities would most likely include the temporary placement of meteorological buoys (i.e., metocean or met buoys) and scientific sampling equipment. Site characterization activities would most likely include geophysical, geotechnical, biological, archaeological, and ocean use surveys. While site characterization activities that extend into state waters and onshore to ports or existing substations are a reasonably foreseeable result of a wind energy lease issued in the Morro Bay WEA, BOEM is not authorizing any activities in state waters and onshore areas and does not have regulatory authority to apply mitigation measures outside of the OCS.

BOEM does not consider the issuance of a lease to constitute an irreversible and irretrievable commitment of agency resources; therefore, this analysis does not consider the impacts associated with the siting, construction, and operation of any commercial wind power facilities.

The issuance of a lease only grants the lessee the exclusive right to submit to BOEM a SAP and COP. The lease does not, by itself, authorize any activity within the lease area. After lease issuance, a lessee would conduct surveys and, if authorized to do so pursuant to an approved SAP, install meteorological measurement devices to characterize the site's weather conditions and to assess the wind resources in the proposed lease area. A lessee would collect this information to determine whether the site is suitable for commercial development and, if so, submit a Construction and Operations Plan (COP) with its project-specific design parameters. BOEM would evaluate the impacts of the activities described in the COP in a separate NEPA process, likely an Environmental Impact Statement (EIS). The EIS process would include but is not limited to: required consultations with the appropriate federal, tribal, state, and local entities; public involvement including public meetings and comment periods; collaboration with the BOEM California Intergovernmental Renewable Energy Task Force; and preparation of an independent, comprehensive, site- and project-specific impact analysis using the best available information. BOEM would use the information and analysis provided through the EIS process to determine whether to approve, approve with modification, or disapprove a lessee's COP pursuant to 30 CFR 585.628. After lease issuance but prior to COP approval, BOEM retains the authority to prevent the environmental impacts of a commercial wind power facility from occurring by disapproving a COP for failure to meet the statutory standards set forth in the Outer Continental Shelf Lands Act (OCSLA).

Based on the experiences of the offshore wind industry in northern Europe, project design and the resulting environmental impacts are often geographically- and design-specific, and it would therefore be premature to analyze environmental impacts related to potential approval of any future COP (Michel et al. 2007; Musial and Ram 2010). A number of design parameters would be identified in a COP including turbine size, anchoring type, project layout, installation methods, and associated onshore facilities.

However, the development of these parameters would be determined by information collected by the lessee during site assessment and site characterization activities, and potential advances in technology during the extensive time period between lease issuance and COP approval. Each design parameter, or combination of parameters, would have varying environmental effects. Therefore, additional analyses under NEPA would be required before any future decision is made regarding construction of wind energy facilities on the OCS.

The timing of lease issuance, as well as weather and sea conditions, would be the primary factors influencing timing of site assessment and site characterization survey activities. Under the reasonably foreseeable scenario, BOEM could issue leases in 2022. SAPs are expected to BOEM within one year of lease issuance (30 CFR 585.601) although lessees could begin survey activities as soon as possible after receiving a lease, preparing a SAP, and when sea states and weather conditions allow for site assessment and site characterization survey activities. For leases issued in late 2022, surveys would likely begin in spring of 2023. Lessees have up to 5 years to perform site characterization and site assessment activities before they must submit a COP (30 CFR 585.235(a)(2)). For leases issued in late 2022, those lessees' surveys could continue through August 2027 prior to submitting COPs.

2.2 Information Considered in Developing this Environmental Assessment

2.2.1 Military Use

Morro Bay WEA encompasses areas that are compatible with military activities to various degrees. The DoD conducts offshore testing, training, and operations within and adjacent to the Morro Bay Wind Energy Area. The Department of Defense (DoD) has identified several concerns related to national security, military testing, and training activities in the WEA, including potential negative impacts of military activities on existing ocean uses including commercial fishing, environmental and cultural resources, maritime vessel traffic, and coastal parks and tourism. BOEM's WEA recommendation is a result of balancing key existing interests, primarily those of military mission compatibility.

2.2.2 Maritime Navigation

The majority of commercial vessels that traverse the Morro Bay WEA carry automated identification system (AIS) transmitters. BOEM conducted a review of 2011 and 2017 AIS vessel information provided to BOEM from the USCG. AIS vessel traffic information is available online at: <https://databasin.org/maps/new#datasets=422db447c151412d918a3085b31429f8>.

BOEM analyzed AIS trackline and density data within the WEA to determine vessel traffic patterns and identify how they may conflict with potential offshore wind energy development. Vessel traffic patterns moved closer to shore between 2011 and 2017 with changes to air quality regulations for vessels within 24 nautical miles from shore. More vessels traversed the Morro Bay WEA in 2017 than in 2011. The majority of AIS vessels traveling through the Morro Bay WEA were cargo ships.

On July 28, 2021, the USCG announced it will conduct a "Pacific Port Access Route Study" (PACPARS) to evaluate safe access routes for the movement of vessel traffic proceeding to or from ports along the western seaboard to determine whether a Shipping Safety Fairway and/or routing measures should be established, adjusted or modified. The PACPARS will help the USCG determine what impacts, if any, the siting of offshore wind facilities may have on existing maritime users and any potential impacts to vessel traffic and maritime navigation. BOEM has coordinated closely with the USCG throughout its planning

and siting process and will continue this coordination to address potential maritime impacts from any future offshore wind development (<https://www.regulations.gov/document/USCG-2021-0345-0001>).

2.2.3 Offshore Infrastructure

Offshore infrastructure in the vicinity of the Morro Bay Wind Energy Area is shown in Figure 2-1. Relevant coastal anthropogenic features identified by BOEM while preparing the Morro Bay EA include submarine telecommunication cables, oil and gas platforms and pipelines, and proposed wind energy areas in California State Waters near Vandenberg Space Force Base. The Morro Bay WEA is bordered in the east by the Monterey Bay National Marine Sanctuary. Additionally, the proposed Chumash Heritage National Marine Sanctuary, if officially designated a marine sanctuary in the future by NOAA, would bound the Morro Bay WEA in the southeast. Geospatial data for these coastal features were compiled from the NOAA Marine Cadastre web portal, and the BOEM and California State Lands Commission websites. See appendix B for additional details.

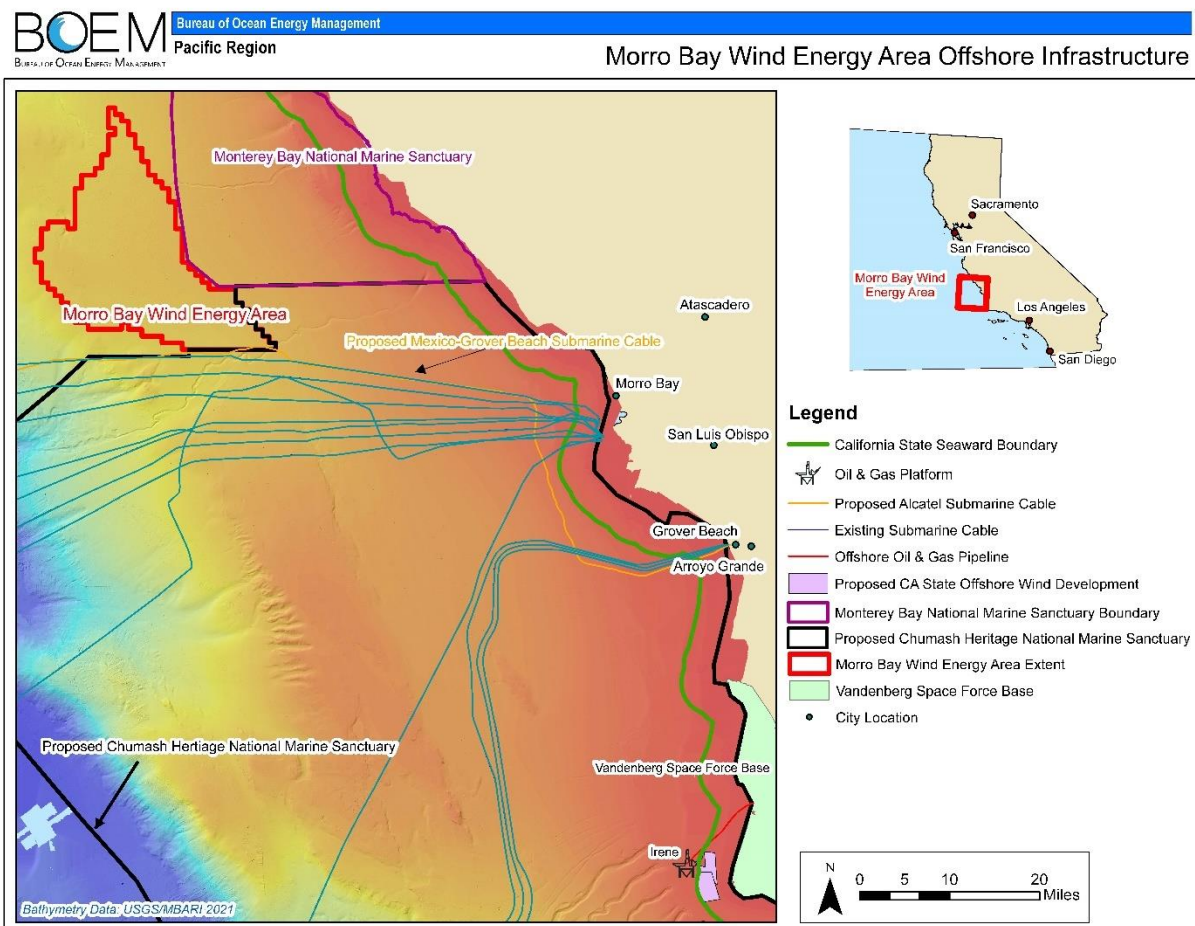


Figure 2-1: Morro Bay Wind Energy Area Offshore Infrastructure

This EA considers information collected through the ongoing outreach efforts and prior EA scoping process:

- Ongoing consultation and coordination since 2016 with the members of the BOEM California Intergovernmental Renewable Energy Task Force.

- Comments received in response to the October 19, 2018, and July 29, 2021, Calls for Information and Nominations associated with wind energy planning in California.
- CA Offshore Wind Energy Planning Outreach Summary Report and Addendum updated June 2021.
- Public response to the November 11, 2021, Notice to Stakeholders to prepare this EA from two online public scoping meetings held December 1, 2021 & January 5, 2022, and public input via www.regulations.gov, docket number BOEM-2021-0044.
- Information from <https://caoffshorewind.databasin.org/>.
- Information collected through the Marine Renewable Energy Working Group (<https://www.opc.ca.gov/2010/05/offshore-wave-energy-development>).

2.2.4 Foreseeable Activities and Impact-Producing Factors

The analysis in this EA considers the effects of lease issuance and routine activities associated with lease and grant site assessment activities (i.e., meteorological buoy deployment, operation, and decommissioning) within the WEA and potential easements associated with surveyed transmission cable corridors, and site characterization activities (e.g., biological, geological, geophysical, geotechnical, and archaeological surveys focused in the WEA).

This analysis does not consider construction and operation of any commercial wind power facilities on a lease or grant in the identified WEA, which would be evaluated separately if a lessee submits a COP.

Impact-producing factors (IPFs) associated with the various activities in the Proposed Action that could affect resources include the following:

- Noise
- Bottom disturbance
- Entanglement
- Vessel traffic and routine discharges
- Economic impacts
- Changes in coastal viewsheds
- Equipment, generator, and vessel air emissions
- Lighting

BOEM does not receive survey plans or a SAP until after a lease is issued, so the following sections describe assumptions about and scenarios of reasonably foreseeable site assessment and site characterization activities based on regulations, relevant experience on the Pacific OCS, and SAPs submitted to BOEM for the Atlantic OCS.

2.2.4.1 *Surveying and Sampling Assumptions*

- Lessees would likely survey the entire proposed lease area during the 5-year site assessment term to collect required information for the siting of up to three metocean buoys and potential commercial wind facilities.

- Site characterization surveys may be conducted before and after the installation of metocean buoys.
- Lessees would perform high-resolution geophysical (HRG) surveys, which do not include the use of air or water compression devices that generate acoustic pulses.
- Survey vessels would travel at a speed of 4.5 knots (kn).

2.2.4.2 *Installation, Decommissioning, and Operations and Maintenance Assumptions*

- Metocean buoy installation would take approximately one day (PNNL 2019).
- One buoy maintenance trip each year per buoy (PNNL 2019).
- Buoy decommissioning would take one day (PNNL 2019) and occur in Year 6 or Year 7 after lease execution.
- On-site inspections and preventative maintenance (e.g., marine fouling, wear, or lens cleaning) are expected to occur yearly.

2.2.4.3 *Noise Generation Assumptions*

The following activities can be expected to generate noise:

- HRG survey equipment (see Chapter 0).
- Coring and sediment sample collection as part of geotechnical sampling.
- Vessel engines during site characterization surveys and metocean buoy(s) installation, maintenance, and decommissioning.
- Diesel engines on metocean buoy(s) where solar/wind are not used for power.

2.2.4.4 *Port Facilities Assumptions*

BOEM assumes that during the site assessment and site characterization stages, a lessee will stage from the Port of Morro Bay, which is approximately 32.2 kilometers (km; 20 miles (mi)) east of the Morro Bay WEA.

BOEM has identified the Port of Morro Bay (BOEM 2016b) as a deep-water port with the potential to be a Quick Reaction Port (a port that is within 2 hours by boat to the project site).

2.2.4.5 *Vessel Traffic*

Vessel trips are anticipated for both site assessment and site characterization activities (Table 2-3). This EA assumes automated identification system generated vessel traffic from 2017 represents most commercial vessels that traverse the area and is a reasonable level of activity for analysis:

The Pacific Northwest National Laboratory (PNNL) deployed LiDAR (light detection and ranging) buoys off of California in the Humboldt and Morro Bay WEAs (PNNL 2019). A 1000-foot marine vessel was used to tow the LiDAR buoy, at 5 km, from Morro Bay to the WEA where they lowered the anchor, mooring line, and attached the buoy and then traveled back to shore in one day. PNNL planned for 3 vessel trips for a 12-month deployment (deployment, mid-year maintenance, recovery). Traffic patterns based on 2017 Automatic Identification System (AIS) data are more concentrated further to sea and closer to shore than in the Morro Bay WEA (Figure 2-2). Tug and tow vessels do traverse the Morro Bay WEA;

however, they are concentrated in the near shore tow lane and further offshore. Cargo ships also traverse the Morro Bay WEA, but use is concentrated further offshore. Tankers did not traverse the Morro Bay WEA in 2017.

Additional vessel traffic assumptions are shown in Table 2-3 in Section 2.4.4.7, and Table 2-4 in Section 2.4.4.8.

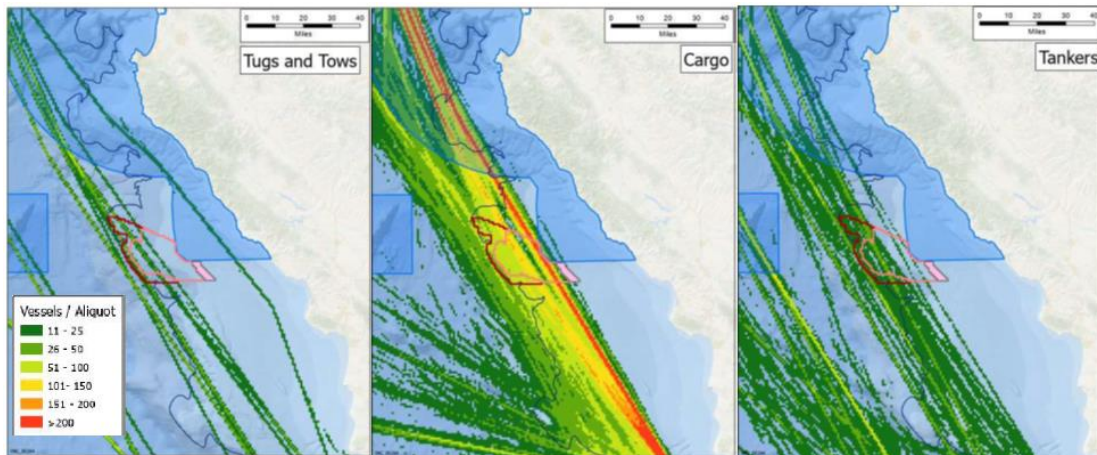


Figure 2-2: Vessel Traffic From 2017 for Tugs and Tows, Cargo, and Tankers In and Near the Morro Bay Wind Energy Area

2.2.4.6 Site Characterization Surveys

Site characterization activities involve geological, geotechnical, and geophysical surveys of the seafloor to ensure that mooring systems, turbines, and cables can be properly located, as well as look for shallow hazards. These survey methods can also be used for surveying archaeological (i.e., historic property) resources. Biological surveys are also part of site characterization surveys and collect data on potentially affected habitats, marine mammals, birds, sea turtles, and fishes.

BOEM regulations require that the lessee provide the results of several surveys with its SAP (30 CFR 585.610–611). Table 2-1 describes the types of site characterization surveys, types of equipment and/or methods used, and which resources the survey information would be used to inform. If applicable survey data is available, additional surveys may not be necessary.

Assumptions for analysis are based on BOEM guidelines that provide recommendations to lessees for acquiring the information required for a SAP under 30 CFR 585.610–611. BOEM has also published Guidelines for Information Requirements for a Renewable Energy SAP (BOEM 2019), which are available at <http://www.boem.gov/Final-SAP-Guidelines/>. BOEM national survey guidelines for some resources can be found at <http://www.boem.gov/Survey-Guidelines/>. National guidelines are applicable for certain resource areas along the U.S. west coast. For the purpose of the Proposed Action scenario, BOEM assumes that the lessee would employ these methods to acquire the information required under 30 CFR 585.610–611 and that these activities would not be conducted concurrently with biological surveys for marine mammals and sea turtles.

Table 2-1: Proposed Site Characterization Survey Details for the Morro Bay Wind Energy Area

Survey Type	Survey Equipment and/or Method	Resource Surveyed or Information Used to Inform
High-resolution geophysical surveys	Side-scan sonar, sub-bottom profiler, magnetometer, multi-beam echosounder	Shallow hazards ¹ , archaeological ² , bathymetric charting, benthic habitat
Geotechnical/sub-bottom sampling ³	Vibra; piston; gravity cores; cone penetration tests	Geological ⁴
Biological ⁵	Grab sampling; benthic sled; underwater imagery/sediment profile imaging; ROV; AUV	Benthic habitats
Biological ⁵	Aerial digital imaging; visual observation from boat or airplane; radar; thermal and acoustic monitoring	Avian
Biological ⁵	Ultrasonic detectors installed on buoy and survey vessels used for other surveys, radar, thermal monitoring	Bats
Biological ⁵	Aerial and/or vessel-based surveys and acoustic monitoring	Marine mammals and sea turtles
Biological ⁵	Direct sampling using vessel-based surveys; underwater imagery; acoustic monitoring; environmental DNA	Fishes and some invertebrates

Notes:¹ 30 CFR 585.610(b)(2)² 30 CFR 585.610(b)(3)³ 30 CFR 585.610(b)(1)⁴ 30 CFR 585.610(b)(4)⁵ 30 CFR 585.610(b)(5)

ROV = remotely operated vehicle AUV = autonomous underwater vehicle

2.2.4.7 Collection of Geophysical Information

HRG surveys would be performed to obtain geophysical hazards information, including information to determine siting for geotechnical sampling, whether hazards will impact seabed support of the turbines, information pertaining to the presence or absence of archaeological and habitat resources, and to conduct bathymetric charting.

Assuming the lessee follows BOEM's guidelines to meet the geophysical data requirements at 30 CFR 585.610–611, BOEM anticipates that the surveys would be undertaken using the equipment to collect the required data as described in Tables 2-1 and 2-2. Vessel traffic assumptions for site characterization are shown in Table 2-3. Equivalent technologies to those shown in these tables may be used if their potential impacts are similar to those analyzed for the equipment described in the EA and are approved by BOEM prior to conducting surveys.

The line spacing for HRG surveys would vary depending on the data collection requirements of the different HRG survey types:

- For the collection of geophysical data for shallow hazards assessments (including magnetometer, side-scan sonar, and sub-bottom profiler systems), BOEM recommends surveying at a 150-m (492-ft) line spacing over the proposed lease area;
- For the collection of geophysical data for archaeological resources assessments, the lessee would likely use survey methods at a line spacing appropriate for the range of depths expected in the

survey area, as long as the sonar system is capable of resolving small, discrete targets 0.5 m (20 inches) in length at maximum range; and

- For bathymetric charting, the lessee would likely use a multi-beam echosounder at a line spacing appropriate to the range of depths expected in the survey area.

Table 2-2: High-Resolution Geophysical Survey Equipment and Methods

Equipment Type	Data Collection and/or Survey Types	Description of the Equipment
Bathymetry/depth sounder (multi-beam echosounder)	Collection of geophysical data for shallow hazards, archaeological resources, benthic habitats, and bathymetric charting	A depth sounder is a microprocessor-controlled, high-resolution survey-grade system that measures precise water depths in both digital and graphic formats. The system would be used in such a manner as to record with a sweep appropriate to the range of water depths expected in the survey area. This EA assumes the use of multi-beam bathymetry systems, which may be more appropriate than other tools for characterizing those lease areas containing complex bathymetric features or sensitive benthic habitats such as hardbottom areas.
Magnetometer	Collection of geophysical data for shallow hazards and archaeological resources assessments	Magnetometer surveys would be used to detect and aid in the identification of ferrous or other objects having a distinct magnetic signature. The magnetometer sensor is typically towed as near as possible to the seafloor and anticipated to be no more than approximately 6 m (20 ft) above the seafloor. This methodology will not be used in the WEA since depths are 500 m or greater, but will be used to survey potential cable routes that will occur in depths shallower than 500 m.
Side-scan sonar	Collection of geophysical data for shallow hazards and archaeological resource assessments	This survey technique is used to evaluate surface sediments, seafloor morphology, and potential surface obstructions (MMS 2007). A typical side-scan sonar system consists of a top-side processor, tow cable, and towfish with transducers (or “pingers”) located on the sides which generate and record the returning sound that travels through the water column at a known speed. BOEM assumes that the lessee would use a digital dual-frequency side-scan sonar system with 300–500 kHz frequency ranges or greater to record continuous planimetric images of the seafloor.
Shallow and medium (seismic) penetration sub-bottom profilers	Collection of geophysical data for shallow hazards and archaeological resource assessments and to characterize subsurface sediments	Typically, a high-resolution CHIRP System sub-bottom profiler is used to generate a profile view below the bottom of the seabed, which is interpreted to develop a geologic cross-section of subsurface sediment conditions under the track line surveyed. Another type of sub-bottom profiler that may be employed is a medium penetration system such as a boomer, bubble pulser or impulse-type system. Sub-bottom profilers are capable of penetrating sediment depth ranges of 3 m (10 ft) to greater than 100 m (328 ft), depending on frequency and bottom composition.

Notes:

CHIRP = Compressed High Intensity Radar Pulse

kHz = kilohertz

Table 2-3: Projected Maximum Vessel Trips for Site Characterization over a 3-Year Period

Survey Task	Number of Survey Days/Round Trips ¹	
	Based on 24-hour Days	Based on 10-hour Days
HRG surveys of all OCS blocks within lease area(s)	64	153
Geotechnical sampling	18	247
Avian surveys	30-54 ²	30-54 ²
Fish surveys	8-365 ³	8-365 ³
Marine mammal and sea turtle surveys	30-54 ²	30-54 ²
Total:	150-555	464-873

Notes:

- ¹ A range has been provided when data or information was available to determine an upper and lower number of round trips. Otherwise, only a maximum value was determined.
- ² Avian, marine mammal and sea turtle surveys are most likely to occur at the same time, from the same vessel. However, since it is possible that they may occur separately, totals include vessel trips for both.
- ³ Number of surveys are conservative estimates, meaning the highest possible number of trips is assumed even though it is unlikely this many trips will take place.

HRG = high-resolution geophysical

2.2.4.8 Instrumentation and Power Requirements

Metocean buoys would be anchored at fixed locations in potential commercial lease areas in order to conduct site assessment activities to monitor and evaluate the viability of wind as an energy source. The activities may include data gathering on wind velocity, barometric pressure, atmospheric and water temperatures, and current and wave measurements. To obtain these data, scientific measurement devices consisting of anemometers, vanes, barometers, and temperature transmitters would be mounted either directly on a buoy or on a buoy's instrument support arms. In addition to conventional anemometers, floating light detection and ranging (FLiDAR) and sonic detection and ranging equipment may be used to obtain meteorological data. To measure the speed and direction of ocean currents, Acoustic Doppler Current Profilers (ADCPs) would most likely be installed. Buoys could also accommodate environmental monitoring equipment, such as bird and bat monitoring equipment (e.g., radar units, thermal imaging cameras), visual or acoustic monitoring equipment for marine mammals and fishes, data logging computers, power supplies, visibility sensors, water measurement equipment (e.g., temperature, salinity), communications equipment, material hoist, and storage containers. Projected vessel traffic in support of metocean buoy placement is shown in Table 2-4.

Table 2-4: Example of Projected Maximum Vessel Trips for Metocean Buoy(s)

Site Assessment Activity	Round Trips	Formula
Metocean buoy installation	3	1 round trip x 3 buoys
Metocean buoy yearly maintenance trips	15	3 buoys x 5 years
Metocean buoy decommissioning	3	1 round trip x 3 buoys
Total buoy trips over 5-year period	21–30	Adds on additional maintenance/weather challenges

This instrumentation, along with associated telemetry systems, will require a reliable energy source with a capacity for long autonomy offshore deployments. To supply this energy, the buoys may be equipped with some combination of solar arrays, lithium or lead acid batteries, and diesel generators. If diesel generators are used, they will require an onboard fuel storage container with appropriate spill protection and an environmentally sound method to perform refueling activities.

2.2.4.9 Buoy Hull Types and Anchoring Systems

To accommodate the required onboard instrumentation and power systems, the buoys must be properly sized and anchored. The National Oceanic and Atmospheric Administration (NOAA) has successfully used boat-shaped hull buoys (known as Naval Oceanographic and Meteorological Automated Devices (NOMAD)) and the newer Coastal Buoy and Coastal Oceanographic Line-of-Sight (COLOS) buoys for weather data collection for many years (Figure 2-3).

The choice of hull type used usually depends on its intended installation location and measurement requirements. To ensure optimum performance, a specific mooring design is produced based on hull type, location, and water depth (National Data Buoy Center 2012). For example, a smaller buoy in shallow coastal waters may be moored using an all-chain mooring. On the OCS, a larger discus-type or boat-shaped hull buoy may require a combination of a chain, nylon, and buoyant polypropylene materials designed for many years of ocean service (National Data Buoy Center 2008). Moorings will be designed to minimize or remove entanglement risk for protected species.

Discus-shaped, boat-shaped, and spar buoys (Figures 2-3, 2-4, and 2-5) are the buoy types that would most likely be adapted for offshore wind data collection. A large discus-shaped hull buoy has a circular hull ranging between 10 and 12 m (33 and 40 ft) in diameter and is designed for many years of service (National Data Buoy Center 2012). The boat-shaped hull buoy is an aluminum-hulled buoy that provides long-term survivability in severe seas (National Data Buoy Center 2012).

Some deep ocean moorings have operated without failure for more than 10 years (National Data Buoy Center 2012). In 2020, PNNL installed two LiDAR buoys off California that had a boat shaped hull and were moored with a solid cast iron anchor weighing approximately 4,990 kg (11,000 lb) with a 2.3 square meter (m²) footprint. The mooring line was comprised of chain, jacketed wire, nylon rope, polypropylene rope and subsurface floats to keep the mooring line taut to semi-taut. The mooring line was approximately 1,200 m long in the Morro Bay WEA (PNNL 2019).

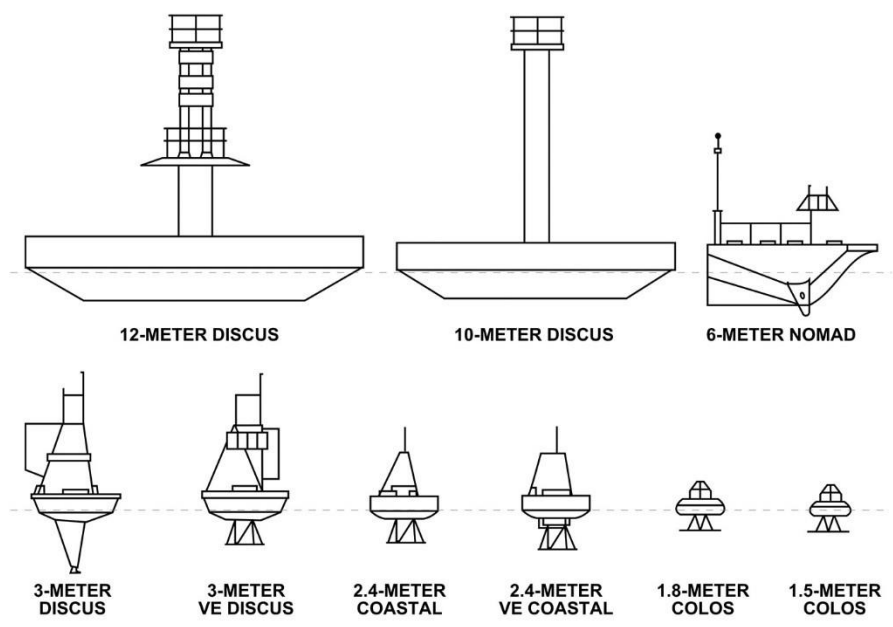


Figure 2-3: Buoy Schematic

Source: National Data Buoy Center 2008



Figure 2-4: 10-Meter Discus-Shaped Hull Buoy

Source: National Data Buoy Center 2012



Figure 2-5: 6-Meter Boat-Shaped Hull Buoy

Source: National Data Buoy Center 2012

2.2.4.10 Buoy Installation and Operation

Buoys would typically take approximately one day to install.

Onshore activity (fabrication, staging, or launching of crew/cargo vessels) related to the installation of buoys is expected to use existing ports that can support this activity. Because buoy transport and deployment does not require the extensive large-scale infrastructure that would be required for

construction of a full-scale offshore floating wind energy facility, there will be a much greater availability of port facilities for placing metocean buoys into service.

Boat-shaped and discus-shaped buoys are typically towed or carried aboard a vessel to the installation location. Once at the location site, the buoy would be either lowered to the surface from the deck of the transport vessel or placed over the final location, and then the mooring anchor dropped. The buoy is anchored to the seafloor with a solid cast iron anchor weighing approximately 11,000 pounds (2.3 sq. meter footprint). The approximate 1650-meter-long mooring line is comprised of various components and materials, including chain, jacketed wire, nylon rope, polypropylene rope, and subsurface floats to keep the mooring line taut to semi-taut, reduce slack, and eliminate looping. The buoy will have a watch circle (i.e. excursion radius) of approximately 1250 meters. After installation, the transport vessel would likely remain in the area for several hours while technicians configure proper operation of all systems. Transport and installation vessel anchoring for one day is anticipated for these types of buoys (PNNL 2019).

Monitoring information transmitted to shore would include systems performance information such as battery levels and charging systems output, the operational status of navigation lighting, and buoy positions. Additionally, all data gathered via sensors would be fed to an on-board radio system that transmits the data string to a receiver onshore (Tetra Tech EC, Inc. 2010).

Because limited space on the buoy would restrict the amount of equipment requiring a power source, this equipment may be powered by small solar panels or wind turbines; however, diesel generators may be used, which would require periodic vessel trips for refueling.

2.2.4.11 Decommissioning

For the purpose of analysis, decommissioning is assumed to be essentially the reverse of the installation process. Equipment recovery would be performed with the support of a vessel(s) equivalent in size and capability to that used for installation (Installation section above). The mooring chain would be recovered to the deck using a winching system, leaving the anchor on the seafloor. The buoy would then be transported to shore by towing (PNNL 2019).

Buoy decommissioning is expected to be completed within one day. Buoys would be returned to shore and disassembled or reused in other applications. BOEM anticipates that the mooring devices and hardware would be re-used or recycled (PNNL 2019).

2.2.5 Non-Routine Events

Reasonably foreseeable non-routine and low-probability events and hazards that could occur during site characterization and site assessment related activities include the following: (1) allisions and collisions between the site assessment structures or associated vessels and other marine vessels or marine life; (2) spills from collisions or fuel spills resulting from generator refueling; and (3) recovery of lost survey equipment.

2.2.5.1 Allisions and Collisions

An allision occurs when a moving object (i.e., a vessel) strikes a stationary object (e.g., met buoy); a collision occurs when two moving objects strike each other. A met buoy in the WEA could pose a risk to vessel navigation. An allision between a ship and a met buoy could result in the damage or loss of the buoy and/or the vessel, as well as loss of life and spillage of petroleum product. Although considered

unlikely, vessels associated with site assessment and site characterization activities could collide with other vessels, resulting in damages, petroleum product spills, or capsizing. Risk of allisions and collisions is reduced through routing measures such as Traffic Separation Schemes (TSS) and safety fairways, as well as U.S. Coast Guard (USCG) Navigation Rules and Regulations.

BOEM anticipates that aerial surveys (if necessary) would not be conducted during periods of reduced visibility conditions as flying at low elevations would pose a safety risk during storms and times of low visibility.

Collisions between vessels and allisions between vessels and met buoys are considered unlikely since vessel traffic is controlled by routing measures such as safety fairways, TSSs, and anchorages. Higher traffic areas were excluded from the WEA. Risk of allisions with met buoys would be further reduced by USCG-required marking and lighting.

2.2.5.2 *Spills*

A spill of petroleum product could occur as a result of hull damage from allisions with a met buoy, collisions between vessels, accidents during the maintenance or transfer of offshore equipment and/or crew, or due to natural events (i.e., strong waves or storms). From 2000 to 2009, the average spill size for vessels other than tank ships and tank barges was 88 gallons (USCG 2011); should a spill from a vessel associated with the Proposed Action occur, BOEM anticipates that the volume would be similar. Diesel fuel is lighter than water and may float on the water's surface or be dispersed into the water column by waves. Diesel would be expected to dissipate very rapidly, evaporate, and biodegrade within a few days (MMS 2007a). The NOAA's Automated Data Inquiry for Oil Spills (an oil weathering model) was used to predict dissipation of a maximum spill of 2,500 barrels, a spill far greater than what is assumed as a non-routine event during the Proposed Action. Results of the modelling analysis showed that dissipation of spilled diesel fuel is rapid. The amount of time it took to reach diesel fuel concentrations of less than 0.05 percent varied between 0.5 and 2.5 days, depending on ambient wind (Tetra Tech Inc. 2015), suggesting that 88 gallons would reach similar concentrations much faster and limit the environmental impact of such a spill.

Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills, and most equipment on the met and buoys would be powered by batteries charged by small wind turbines and solar panels. BOEM expects that each of the vessels involved with site assessment and site characterization activities would minimize the potential for a release of oils and/or chemicals in accordance with 33 CFR Parts 151, 154, and 155, which contain guidelines for implementation and enforcement of vessel response plans, facility response plans, and shipboard oil pollution emergency plans. Based on the size of the spill, it would be expected to dissipate very rapidly and would then evaporate and biodegrade within a day or two (at most), limiting the potential impacts to a localized area for a short duration.

2.2.5.3 *Recovery of Lost Survey Equipment*

Equipment used during site assessment and site characterization activities (e.g., towed HRG survey equipment, cone penetration test components, grab sampler, buoys, lines, cables) could be accidentally lost during survey operations. Additionally, it is possible (although unlikely) that a met buoy could disconnect from the clump anchor. In the event of lost equipment, recovery operations may be undertaken to retrieve the equipment. Recovery operations may be performed in a variety of ways, including ROVs and grapnel lines, depending on water depth and equipment lost. If grapnel lines (e.g., hooks, trawls) are used to retrieve lost equipment, extensive bottom disturbances could result from

dragging the line along the bottom until it hooks the lost equipment. This may require multiple passes in a given area. In addition, after the line catches the lost equipment, components will be dragged along the seafloor until recovery.

Where lost survey equipment is not able to be retrieved because it is either small or buoyant enough to be carried away by currents or is completely or partially embedded in the seafloor (for example, a broken vibracore rod), a potential hazard for bottom-tending fishing gear may occur, and additional bottom disturbance may occur. A broken vibracore rod that cannot be retrieved may need to be cut and capped 1–2 m (3–6.5 ft) below the seafloor. For the recovery of lost survey equipment, BOEM will work with the lessee/operator to develop an emergency response plan. Selection of a mitigation strategy would depend on the nature of the lost equipment, and further consultation may be necessary.

IPFs associated with recovery of lost survey equipment may include vessel traffic, noise and lighting, air emissions, and routine vessel discharges from a single vessel. Bottom disturbance and habitat degradation may also occur as a result of recovery operations

2.3 No Action Alternative

Under the No Action Alternative, no leases or grants would be issued in the Morro Bay WEA at this time. Site characterization surveys and off-lease site assessment activities as described in the Proposed Action do not require BOEM approval and could still be conducted under the No Action Alternative, but these activities would not be likely to occur without a commercial wind energy lease or grant. The No Action Alternative will serve as the shifting baseline (changes over time) of current conditions (described in Chapter 3, Affected Environment) against which action alternatives are evaluated.

2.4 Alternatives Considered but Not Analyzed Further

Through the Area ID process, the WEA underwent winnowing as a result of extensive coordination with the Task Force; relevant consultations with Federal, state, and local agencies; and input from the public, potentially affected stakeholders, and potential developers, due to concerns related to visual resources, marine protected species, cable placement, recreational and commercial fishing, and vessel navigation. On November 10, 2021, BOEM released the Area ID Memorandum, which documents the analysis and rationale used to develop recommendations for the Morro Bay WEA. Because of the winnowing that has already occurred and because the Proposed Action will not result in the approval of a wind energy facility and is expected to result only in site assessment and site characterization activities, BOEM has not identified any action alternatives that could result in meaningful differences in impacts to the various resources analyzed in this draft EA. In addition, scoping and public comments did not suggest alternatives that met the purpose and need (including comparing other forms of energy such as nuclear, solar, or oil and gas to wind; considering only the No Action alternative; and analyzing the impacts of siting, construction, and operation of wind towers) or would have resulted in different impacts.

3 Description of Affected Environment and Environmental Impacts

3.1 GEOLOGY

3.1.1 Affected Environment

The Holocene marine geology of the Morro Bay WEA reflects the Cenozoic regional tectonics and depositional stages unique to the offshore Santa Maria Basin. Local geologic features of interest within the WEA identified during recent United States Geologic Survey marine geological and geophysical research cruises include active faulting, submarine landslides, steep seafloor slopes, seafloor pockmarks, and rock outcrops (Figure 3-1, Figure 3-2, Figure 3-3). The Big Sur pockmark field mapping was extended (Lundsten et al., 2019) with more than 15,000 seafloor pockmarks covering much of the subaerial extent of the proposed Morro Bay WEA.

Within regulations outlined in 30 CFR 585, the BOEM requires a lessee to submit a SAP as part of the development process of a renewable energy lease. With the SAP, the lessee is required to provide marine site characterization survey and sampling information to ascertain local geologic and geotechnical conditions that may impact the design and installation of SAP facilities. For the Morro Bay WEA, BOEM anticipates these site characterization surveys to include high-resolution multibeam bathymetry, side scan sonar, magnetometer, sub-bottom profiler, minisparker, sediment grab samples, piston cores, and cone penetrometer tests. These site characterization activities will also be performed to generate information to be used for the preparation and submittal of a COP.

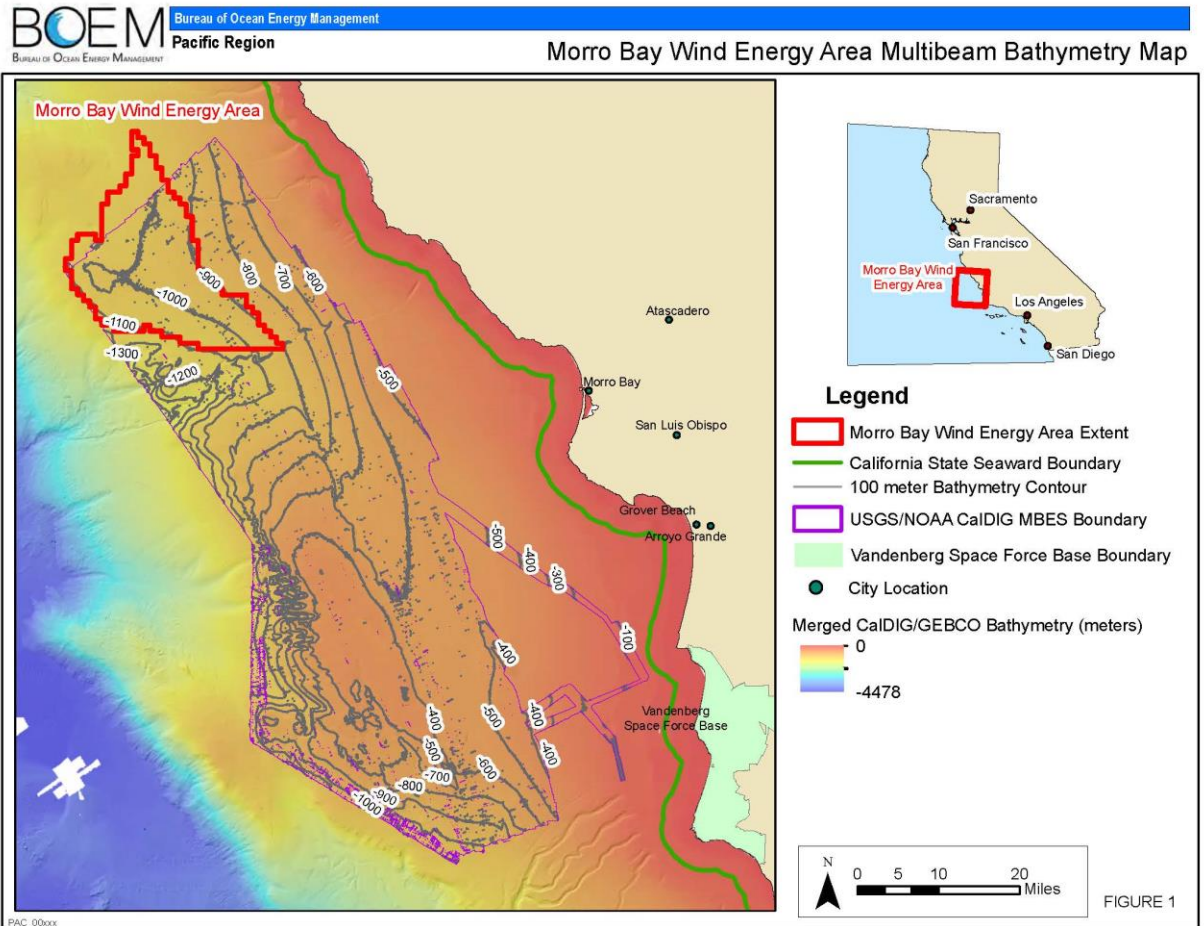


Figure 3-1: Central California Multibeam Bathymetry Released by United States Geologic Survey

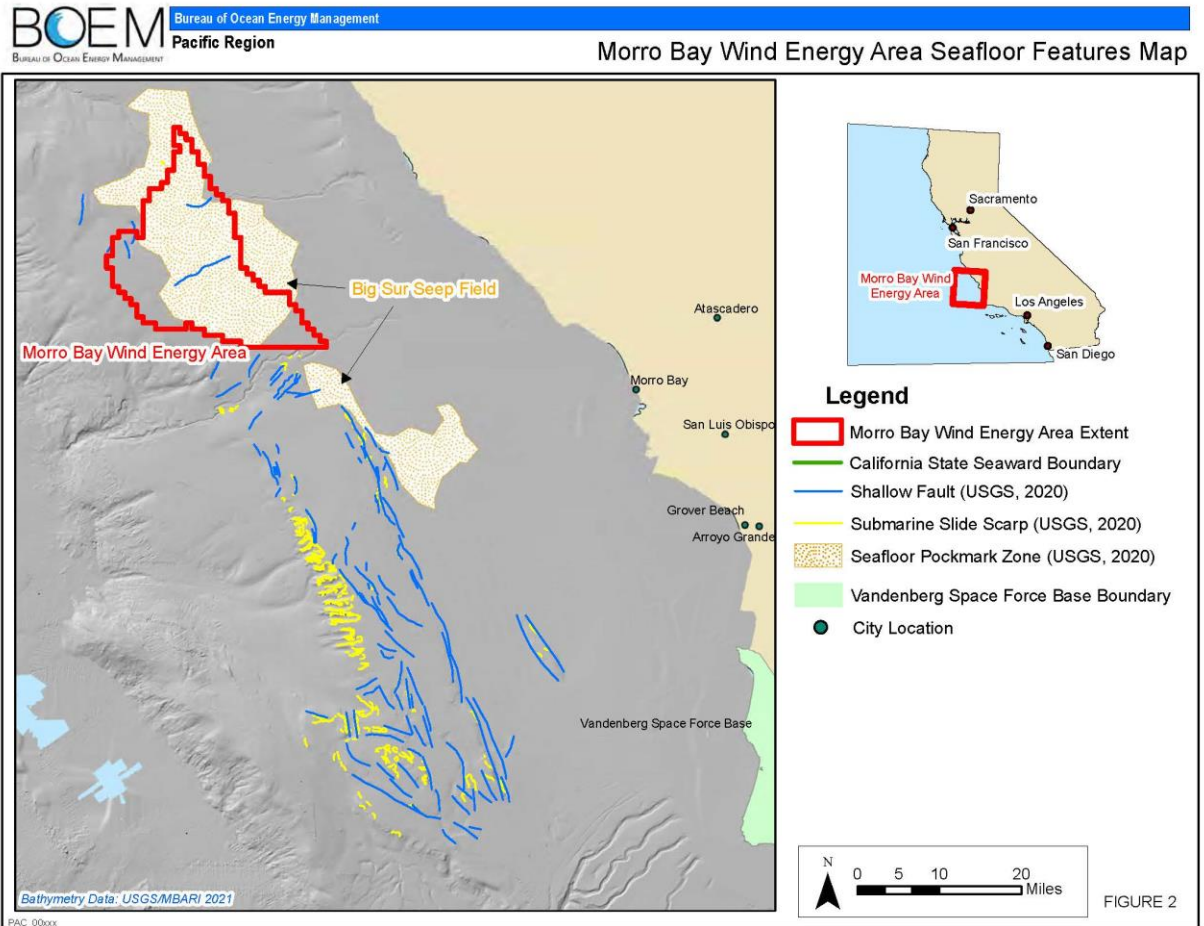


Figure 3-2: Morro Bay Wind Energy Area Seafloor Features

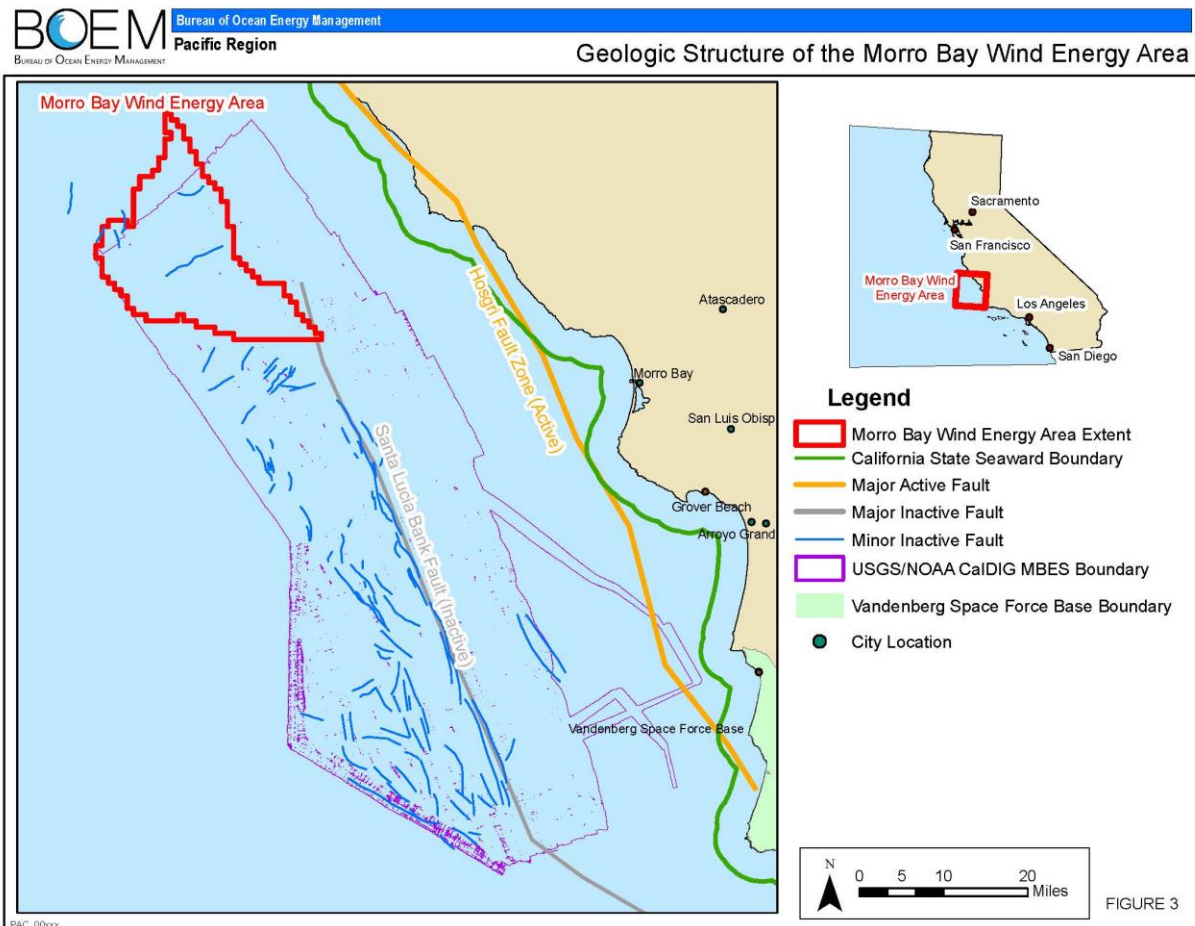


Figure 3-3: Morro Bay Wind Energy Area Geologic Structure

3.1.2 Impacts of the Proposed Action

While the geology of the Morro Bay WEA is complex, the anticipated impact to the local geologic resources by activities performed as part of a SAP would be negligible. No marine geophysical data acquisition would impact the seafloor or subseafloor geology, and any shallow geotechnical sampling within the WEA would result in only minor, temporary disturbance of the upper 25 m (82 ft) of Quaternary sediment that underlies the seafloor.

3.1.3 No Action Alternative

Under this alternative, commercial leases and grants would not be issued in the Morro Bay WEA. The implementation of the No Action Alternative would mean that the minor, temporary disturbances to local geological resources associated with the Proposed Action would not occur. BOEM expects ongoing activities and planned actions to have continuing regional impacts on geological resources over the timeframe considered in this EA.

3.2 AIR QUALITY

3.2.1 Affected Environment

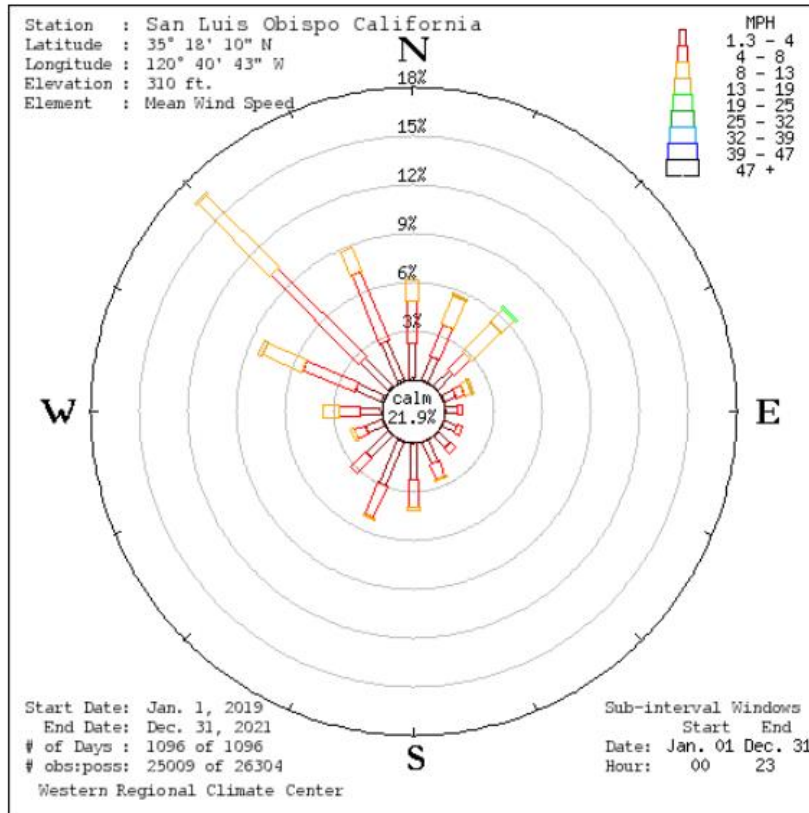
Air quality is defined by the concentration of pollutants, including greenhouse gasses (GHGs), in the ambient atmosphere. Pollutant concentrations are determined by a variety of factors, including the quantity and timing of pollutants released by emitting sources, atmospheric conditions such as wind speed and direction, the presence of sunlight, and barriers to transport such as mountain ranges.

The Proposed Action's potential area of impact on the human environment is the western portion of San Luis Obispo County, California, which is the corresponding onshore area with respect to the Morro Bay WEA. Depending on wind velocity, the Silver Peak Wilderness in south Monterey County may also be a receptor area. Silver Peak Wilderness is not a Class 1 Wilderness Area and does not have special air quality protections afforded by Section 162(a) of the Clean Air Act.

Air pollutants can be classified as criteria pollutants, hazardous air pollutants (HAPS), and greenhouse gases (GHGs). The criteria pollutants are carbon monoxide, lead, ground-level ozone, particulate matter, nitrogen dioxide, and sulfur dioxide, and are regulated under the health-based National Ambient Air Quality Standards (NAAQS). HAPs are those pollutants that are known to cause cancer or other serious health effects. These pollutants are frequently associated with specific industries or equipment, for example, benzene from oil and gas operations. GHGs are gases that trap heat in the atmosphere. The primary GHGs are carbon dioxide, methane, and nitrous oxide. Fossil fuel combustion represents the vast majority of the energy-related GHG emissions, with carbon dioxide being the primary GHG (U.S. EPA, 2019). In contrast to the NAAQS and HAPs contaminants, which have more local impacts, GHGs have a global impact.

Air pollutants are transported primarily by wind, so the wind speed and direction are significant factors to consider in determining adverse impacts. Figure 3-4 shows a wind rose for a monitoring station located in the city of San Luis Obispo for the time period of January 1, 2019, through December 31, 2021 (WRCC, 2022). According to this data, wind direction is predominantly from the northwest. This indicates that pollutant emissions created in the Morro Bay WEA will tend to drift southeast towards Morro Bay.

The Federal and State attainment status for San Luis Obispo County NAAQS contaminants is found at 40 CFR 81.305. San Luis Obispo County is in attainment or unclassifiable for all National Ambient Air Quality Standards (NAAQS), with the exception of the federal ozone standard for East San Luis Obispo County. San Luis Obispo County APCD has been delegated by the U.S. EPA to regulate air pollution on the OCS in accordance with section 328 (a) (3) of the Clean Air Act (SLO Co. APCD, 1990).



San Luis Obispo California - Wind Frequency Table (percentage)

Latitude : 35° 18' 10" N	Start Date : Jan. 1, 2019	Sub Interval Windows
Longitude : 120° 40' 43" W	End Date : Dec. 31, 2021	Start End
Elevation : 310 ft.	# of Days : 1096 of 1096	Date Jan. 01 Dec. 31
Element : Mean Wind Speed	# obs : poss : 25009 of 26304	Hour 00 23

Figure 3-4: San Luis Obispo Windrose
 Source: Western Regional Climate Center (WRCC)

3.2.2 Impacts of the Proposed Action

The factors associated with this project that can potentially produce adverse impacts on air quality are summarized in Table 3-1. The primary contaminants emitted are carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), fine particulate matter (PM_{2.5}), marine diesel, lube oils, and greenhouse gases, though these emissions would be generated in very low quantities.

Carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM are criteria pollutants that are regulated under the NAAQS, which are health-based standards. Marine diesel and lube oils may contain HAPs, primarily benzene, and have adverse human health effects. They are also hydrocarbons, which, if volatilized, become precursors of photochemical smog (i.e., ozone, which is another NAAQS contaminant). Nitrogen dioxide, in the presence of sunlight, is also an ozone precursor. The primary GHG emitted is carbon dioxide. GHGs, in contrast to the other contaminants in Table 3-1, have a global,

rather than local, impact. Carbon dioxide traps heat in the atmosphere and creates adverse impacts such as climate change, ocean acidification, and sea level rise.

Table 3-1: Factors That Can Potentially Produce Adverse Impacts on Air Quality

Source	Impact Producing Factors (IPFs)	Primary Contaminants
Marine vessels	<ul style="list-style-type: none"> Stack emissions Fugitive emissions¹ Fuel and lubricant spills 	CO, NO ₂ , PM _{2.5} , SO ₂ , marine diesel, lube oils, greenhouse gases
Auxiliary engines	<ul style="list-style-type: none"> Stack emissions Fugitive emissions Fuel and lubricant spills 	CO, NO ₂ , PM _{2.5} , SO ₂ , marine diesel, lube oils, greenhouse gases
Buoy back-up generators	<ul style="list-style-type: none"> Stack emissions Fugitive emissions Fuel and lubricant spills 	CO, NO _x , PM _{2.5} , SO ₂ , marine diesel, lube oils, greenhouse gases
Trucks and locomotives	<ul style="list-style-type: none"> Engine exhaust 	CO, NO _x , and PM _{2.5} , SO ₂ , greenhouse gases
Goods-movement equipment	<ul style="list-style-type: none"> Engine exhaust 	CO, NO _x , and PM _{2.5} , SO ₂ , greenhouse gases

Notes: NO_x = Oxides of nitrogen

¹ Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening (40 CFR 70.2). NO_x = Oxides of nitrogen

3.2.2.1 Marine Vessels

Marine vessels are the source of stack emissions from the main exhaust stack of the engine that is used to propel the vessel. These emissions are primarily the products of combustions: carbon monoxide (CO), nitrogen oxides (NO_x), and fine particulate matter (PM_{2.5}), oxides of sulfur (SO_x) and greenhouse gases (GHG). Fugitive hydrocarbon emissions may occur from the transfer and storage of fuel. Hydrocarbon emission may also result from fuel and lubricant spills.

All marine vessels used for surveys are expected to comply with California Air Resources Board regulations for engine upgrade requirements, as well as monitoring, recordkeeping, and reporting requirements (CARB, 2017).

3.2.2.2 Auxiliary Engines

Auxiliary engines are those internal combustion engines that are not used for the propulsion of the vessel and are used to power onboard equipment such as cranes, electrical generators, pumps, and compressors. Air emissions from auxiliary engines include CO, NO_x, and PM_{2.5}, and GHG, primarily carbon dioxide. Fugitive hydrocarbon emissions may occur from the transfer and storage of fuel. Hydrocarbon emission may also result from fuel and lubricant spills.

3.2.2.3 Back-up Generator for Buoy(s)

Buoys may be deployed with onboard back-up generators in case the buoy batteries or battery recharging system fail. Buoy back-up generators are generally powered by diesel fuel. Air emissions are primarily CO, NO_x, and PM_{2.5}, and greenhouse gases. The possibility of a fuel spill also exists during filling operations and if the generator's fuel tank is ruptured.

3.2.2.4 Truck and Locomotive Traffic

Trucks and trains may be used to transport equipment and personnel to and from the onshore staging area(s). Associated air emissions would be CO, NO_x, PM_{2.5}, SO_x, and greenhouse gases.

3.2.2.5 Goods-Movement Equipment

Goods-movement equipment includes cranes, gantries, and winches, and are used to load and unload equipment and materials onto docks, boats, barges, or intermodally. Associated air emissions would be CO, NO_x, PM_{2.5}, SO_x, and greenhouse gases.

Conclusion

The assumptions are that there will be one to three leases granted, with each lease requiring the use of two or three marine vessels, and each vessel being powered by two diesel engines in the 1,000 horsepower (hp) range. Each vessel will have onboard two or more auxiliary engines in the range of 20 to 60 kW. If the buoy(s) have onboard generators, they will be small, probably in the 15 hp range. Vessel activity will primarily take place between 20 and 50 mi offshore and, if there are multiple leases granted, survey activity may not occur simultaneously.

The anticipated level of activity will result in air emissions that will have negligible adverse impacts on the corresponding onshore area. Emissions will mix in the ambient atmosphere, be quickly dissipated, and will be indistinguishable from the emissions created by other daily vessel traffic offshore San Luis Obispo County.

Quantification of emissions from comparable wind energy project site assessments and site characterizations can be found in various BOEM studies. For example, BOEM Environmental Assessment 2015-038 (Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore North Carolina) estimates emissions in Table 3-2.

Table 3-2: Example Emissions from WEA Site Characterization and Site Assessment

Activity	CO	NO _x	VOCs	PM ₁₀	PM _{2.5}	SO _x	CO ₂	N ₂ O	CH ₄	CO ₂ e
Site Characterization Surveys	3.50	37.99	1.46	2.07	2.07	3.74	1,828.78	0.05	0.24	1,900.47
Site Assessment: Construction of Meteorological Towers ¹	0.36	2.11	0.43	0.14	0.14	0.20	131.33	0.003	0.04	144.39
Site Assessment: Operation of Meteorological Towers	4.03	22.04	1.85	1.47	1.47	1.64	790.99	0.01	0.04	801.83
Site Assessment: Decommissioning of Meteorological Towers ¹	0.36	2.75	0.44	0.16	0.17	0.27	164.32	0.00	0.04	176.07
Sum of emissions from all sources²	8.26	64.89	4.18	3.85	3.85	5.86	2,915.42	0.07	0.35	3,022.77

Notes: Units are tons per year (Metric tons per year for greenhouse gases) in a single year.

¹ Towers are not being considered but this serves as a conservative (high) estimate for construction, deployment, and decommissioning of meteorological buoys and equipment.

² Sum of individual values may not equal summary value because of rounding.

CO = carbon monoxide NO_x = nitrogen oxides VOCs = volatile organic compounds

PM₁₀ = particulate matter with aerodynamic diameters of 10 microns or less

PM_{2.5} = particulate matter with aerodynamic diameters of 2.5 microns or less

SO_x = sulfur oxides CO₂ = carbon dioxide N₂O = nitrous oxide CH₄ = methane

CO₂e = carbon dioxide equivalent

Source: Environmental Assessment, BOEM 2015-03

Air emissions from vessels, onboard auxiliary engines, and buoys are expected to be either negligible or minor. Survey vessels and ancillary equipment emit a variety of air pollutants, including nitrogen oxides, sulfur oxides, particulate matter, volatile organic compounds, carbon monoxide, and greenhouse gases. The air emissions from this project are anticipated to be primarily from the survey vessels' propulsion engines and engines that power ancillary equipment. Lesser amounts of air pollutants may be emitted from trucks, locomotives, and goods-movement equipment if they are used to transport equipment and personnel to the project staging area.

The air emissions from trucks, locomotives, and goods-movement equipment will be negligible due to the infrequent nature of the activities associated with this project (e.g., unloading and loading a buoy) and the expected level of emissions. The GHG emissions from this action will be from one or two marine vessels operating per lease and while this level of emissions would be additive to the global inventory, it is not expected to have any measurable impacts on the local environment.

3.2.3 No Action Alternative

Under this alternative, commercial leases and grants would not be issued in the Morro Bay WEA, and G&G activities would not occur pursuant to wind energy development. However, BOEM expects ongoing activities and planned actions to have continuing regional impacts on air quality. Impacts from urban development and increasing air, vessel, and onshore traffic will continue to contribute to climate change and will have negative impacts on air quality. Implementation of the No Action Alternative would not meaningfully reduce ongoing impacts to air quality from existing and potential future actions.

3.3 WATER QUALITY

3.3.1 Affected Environment

The affected environment for water quality spans central California coastal waters to 3 nmi, OCS marine waters within the WEA, and navigation routes between the lease area and the Port of Morro Bay. Physical and chemical properties intrinsic of a water's quality are essential in providing life with essential elements and as such, water and influencing sediment quality for both coastal and marine waters are provided below.

3.3.1.1 Coastal Waters

The central California Current System is highly productive due to wind-driven upwelling of nutrient-rich water (Ryan et al., 2009). Common during spring and early summer, upwelling periods are characterized by strong winds from the north and northwest that convey high nutrient, low oxygen, low temperature, and moderately high saline waters to the nearshore environment, including estuaries (Brown and Nelson, 2015). During low wind periods, common in late summer and early fall, the southerly set California Current moves closer to shore bringing low nutrient concentrations, higher temperatures, and moderate salinities to the nearshore environment. Strong southerly winds common in late fall and winter coupled to the northerly set Davidson Current convey waters to the nearshore environment with moderate nutrient concentrations, high sediment loads, low salinity, and oxygen saturation. Although these hydrographic conditions are associated with broad seasonal climatic shifts, these events have been observed to occur at any time of the year. Sea surface temperatures in the central California coast region reflect the upwelling conditions more than they do seasonal heating and cooling (Kaplan et al., 2010). Nearshore coastal waters generally have higher turbidities than offshore marine waters,

particularly during spring runoff or storm events when resuspension of small sediment particles result from an increase of riverine input, waves and currents (USEPA, 1995).

3.3.1.2 *Morro Bay Watershed*

The Morro Bay region experiences a variety of land-use and water-based activities that are contributing sources for point-and non-point pollution to sediment, and fresh and marine water quality. Recreation, industrial enterprises, agriculture, mariculture, fishing, dredging, shipping, and urban development are common affairs in the Morro Bay Region area; local land use includes about 60 percent ranchland, 19 percent brushland, 7 percent urban areas (City of Morro Bay, Los Osos, and Baywood), 7 percent agriculture (crops), and 7 percent woodland (USACOE, 2013). Located in the central area of coastal San Luis Obispo County, the Morro Bay Watershed, is composed of two major sub-watersheds that drain into Chorro and Los Osos Creeks. The Chorro Creek sub-watershed accounts for about 60 percent of the total land area draining into the Morro Bay estuary (San Luis Obispo County, 2014).

3.3.1.2.1 *Morro Bay Estuary*

Morro Bay, the largest estuary in San Luis Obispo County, is a 2,300-ac semi-enclosed body of water bordered to the west by a four-mile vegetated natural sand spit that separates Morro Bay from the Pacific Ocean (USACOE, 2013). The estuary environment encompasses the lower reaches of Chorro and Los Osos creeks, a wide range of wetlands, salt and freshwater marshes, intertidal mud flats, eelgrass beds, and other subtidal habitats. Morro Bay hosts one of the most significant and least disturbed wetland systems on the central and southern California coast (Morro Bay National Estuary Program, 2012) and is recognized by the U.S. Environmental Protection Agency (EPA) as one of 28 sites within the National Estuary Program (Morro Bay National Estuary Program, 2021; USACOE, 2013). Dredging and sediment bypassing in the vicinity of, and from the entrance of Morro Bay has occurred from the 1940s to the present day. A volumetric dredging history of Morro Bay is presented by the U.S. Army, Corps of Engineers (USACOE) (2016) including a discussion of potential sediment receiver sites in coastal waters near the entrance of Morro Bay.

3.3.1.2.2 *CWA Section 303(d) List of Impaired Waterbodies*

Pursuant to Clean Water Act Sections 303(d) and 305(b) (33 U.S.C. §§ 1313(d), 1315(b)), California is required to report to the EPA on the overall quality of the waters within its boundaries.

Previously, surface water impairments in the Morro Bay watershed have included pollutant exceedances of California water quality standards for *E. coli.*, fecal coliform, temperature, nutrients, sediment, pathogens, nitrate, and low dissolved oxygen (NCCES, 1994; Samadpour et al, 2005; San Luis Obispo County, 2014; SWRCB, 2018; USEPA, 2011). In response to these elevated pollutant levels, Chorro Creek, Los Osos Creek, and Morro Bay (including the Morro Bay Estuary) have been listed on the CWA Section 303(d) list as impaired resulting in State and Central Coast Regional Water Quality Control Boards adopting pollutant specific Total Maximum Daily Loads for these waterbodies (CCRWQCB, 2002; Coastal San Luis Resource Conservation District, 2020; CAEPA, 2006; USEPA, 2004, 2009).

Morro Bay continues to be listed on the 303(d) list for impairment of water quality by sedimentation/siltation with agriculture, grazing, land development, and habitat modification identified sources for increasing sedimentation/siltation into Morro Bay (SWRCB, 2016; SWRCB, 2021)). The CAEPA 2020-2022 Integrated Draft Staff Report (2020) has recommended revisions to the 303(d) list for surface waters in the Morro Bay watershed, with some pollutants pending approval for delisting. The final CAEPA 2020-2022 Integrated Report with the approved 303(d) list of impaired waterbodies, including the Morro Bay

watershed, is scheduled to be available in mid-2022 (SWRCB, 2021). Recognizing the need for protection from polluted runoff, the California Coastal Commission has designated Morro Bay, Chorro Creek, and Los Osos Creek as Critical Coastal Areas (CCC, 2021; San Luis Obispo County, 2014).

3.3.1.3 Marine Water

Water quality generally improves from coastal to marine locations, as onshore contaminants more commonly impact nearshore coastal waters than contaminants originating in marine waters. In the National Coastal Condition Report IV (EPA, 2012), EPA assessed the overall water quality of the west coast region based on an index derived from five water quality parameters: nutrient concentrations, (as indicated by nitrogen and phosphorus), dissolved oxygen, water clarity, and chlorophyll a. (EPA, 2012). The overall rating for the west coast coastal waters was “Good” including coastal waters in the Morro Bay Region (see Figure 6.5, EPA, 2012).

Included in EPA’s National Coastal Condition Report IV (EPA, 2012) is an assessment and rating of west coast sediment quality. Based on three sediment quality indicators: sediment toxicity, sediment contaminants, and sediment total organic carbon, the marine sediment quality index was rated as “Fair” for the west coast region (EPA, 2012). However, the sediment quality index rating for coastal waters around the Morro Bay region was rated as “Poor”, due to measurements of sediment toxicity (see Figure 6.6, EPA 2012). EPA (2012) acknowledges that although the sediment toxicity results in support of the National Coastal Condition Report IV should be considered provisional for a variety of reasons and the interpretation of the results as “Unclear”, the sediment toxicity indicator for this period was virtually identical to previous periods. The other two sediment quality indicators, sediment contaminants and sediment total organic carbon, were both rated “Good” for coastal waters in the Morro Bay region (Figure 6-14 and 6-15, EPA 2012).

3.3.2 Impacts of the Proposed Action

Routine activities associated with the Proposed Action impacting coastal and marine waters, and sediment quality include vessel discharges (including bilge and ballast water, and sanitary waste), geotechnical and benthic sampling, and installation and decommissioning of meteorological buoys. Oil and petroleum hydrocarbon spills are non-routine events that would impact water quality.

Under the CWA it is unlawful for any person to discharge any pollutant from a point-source into navigable waters without a permit under its provisions. The EPA regulates discharges incidental to the normal operation of all non-recreational, non-military vessels greater than 24 m (79 ft) in length into U.S. waters, under Section 402 of the CWA (EPA 2013 Vessel General Permit (VGP)). Small vessels and fishing vessels of any size must follow ballast water discharge requirements established in the EPA 2013 (VGP) and the USCG ballast water regulations at 33 CFR 151.10. Short-term and localized impacts to coastal and marine waters from vessel discharges by the introduction of total suspended solids, nutrients, organics, and oil and grease would be expected to diffuse rapidly in the water column without settling to the seafloor. Adherence to applicable permits and regulatory requirements for vessel discharges by local authorities, State of California (SOC), USCG, and EPA serves to minimize and mitigate discharges with no lasting impacts to water quality expected.

Vessel anchoring, coring, and collection of bottom samples associated with geotechnical surveys and benthic sampling would cause localized seafloor disturbance temporarily by increasing turbidity and reducing water clarity from resuspension of sediments into the water column. Collection of bottom samples is estimated to impact up to 10m² (108 ft²) per sample, although the core or grab sample

extraction area may be much smaller (BOEM 2014). Short-term and localized resuspension of seafloor sediment into the water column is not expected to result in any lasting impact to water or sediment quality in either the WEA or along any surveyed projected transmission cable route. Upon cessation of the sampling, suspended sediment would immediately begin to settle to the seafloor with water quality promptly returning to ambient conditions.

Anchoring, installation, and decommissioning of meteorological buoys results in a greater disturbance to the seafloor than benthic sampling, consequently impacting water quality over a larger area. Anchors for boat-shaped and disc-shaped buoys have a footprint of about 0.55 m² (6 ft²) and an anchor sweep impact area of approximately 8.5 ac (3.4 hectares) (BOEM, 2014). A temporary resuspension of sediments into the water column would be expected during the one-day met buoy anchoring, installation, and decommissioning activities. This projected short-term duration would result in no lasting impact to water or sediment quality with ambient conditions likely throughout the operation and following decommissioning of the buoys. In the unlikely event of recovering lost equipment, seafloor disturbance and the resultant resuspension of sediments into the water column would be expected during the recovery operation. Transient and localized resuspension of sediment would temporarily impact water quality, but a return to ambient conditions would be expected immediately following the termination of the recovery operation.

Accidental releases of oil and petroleum products (e.g., diesel, lubricates) due to non-routine events are likely to result in small, short-term impacts on water quality over a localized area in the immediate vicinity of the release/spill.

Impacts to water quality from vessel discharges, sediment disturbance from geotechnical surveys, benthic sampling, met buoy installation/decommissioning, recovery of lost equipment, and oil spills in coastal and marine water quality would be minor, with any impacts being small in magnitude, highly localized, and short-term.

3.3.3 No Action Alternative

Under this alternative, commercial leases and grants would not be issued in the Morro Bay WEA. However, BOEM expects ongoing activities and planned actions to have continuing regional impacts on water quality over the timeframe considered in this EA. Impacts from urban development, mariculture, vessel discharge, and increasing vessel traffic will continue to contribute to climate change and will have negative impacts on water quality. Implementation of the No Action Alternative would not meaningfully reduce ongoing impacts to water quality from existing and potential future actions.

3.4 MARINE AND COASTAL HABITATS AND ASSOCIATED BIOTIC ASSEMBLAGES

3.4.1 Affected Environment

The Morro Bay WEA lies within the Southern California Planning Area and contains a variety of subtidal habitats (ANL 2019). The proximity of the WEA to a major biogeographic break, Point Conception, enhances regional biodiversity due to the contribution of species from both the cool-temperate Oregonian and warm-temperate Californian Biogeographic Provinces (Burton 1998). Large-scale upwelling at Point Conception brings dissolved nutrients to the surface which in turn enhances biological productivity within the region (Dugdale and Wilkerson, 1989). General references that describe the study region or the relevant ecological patterns within the California Current System include ADL (1985), SAIC (1986, 1992), and Allen et al. (2006), and studies that specifically examine the WEA include Kuhnz

et al. (2021) and Walton et al. (2021). These studies are incorporated by reference into this section. The Morro Bay WEA does not contain any Area of Special Biological Significance, National Park, or National Marine Sanctuary. Key habitats and their characteristic species which may be affected by the proposed project are summarized below. The Pacific Fishery Management Council (PFMC) classifies all of the regional habitats as essential fish habitat for one or more federally managed fisheries (PFMC 1998; 2000; 2006; 2007).

3.4.1.1 Outer Shelf and Upper Slope Habitats

Outer shelf and upper slope habitats. The ecosystem here is defined as the soft and hard substrates at depths between 100 m and 1,500 m (328 ft and 4,921 ft) and includes a few meters of the water column immediately above the seabed. The WEA benthos is entirely comprised of upper slope habitats between 900 m and 1300 m (2,953 ft and 4,265 ft). Interpreted seafloor features (geoforms) and associated groups of biological communities were collected from remote sensing and ROV surveys (Kuhn et al., 2021, Walton et al. 2021, Cochrane et al. 2022). Within the larger study region, soft sediments (sand, mud) cover most of the area and are interspersed with infrequent outcrops of hard substrate (Figure 3-5, left). Depth and substrate type are key structuring processes for invertebrate communities. For example, sediments on the continental shelf generally consist of sandy habitats nearshore and are dominated by filter-feeding organisms. Progressively deeper environments of silt and clay sediments follow, along with an increase in deposit feeders. At the shelf break, where the continental slope begins, the sediment becomes completely silt and clay (e.g. mud). There are three distinct community groups, called biotas, associated within the soft sediments of the Morro Bay WEA (Figure 3-5, right). Of note is that species community groups were similar in and out of pockmark features. The larger invertebrates species inhabiting the WEA seabed include echinoderms (e.g. sea cucumbers, sea stars, brittle stars, urchins, and crinoids), cnidarians (e.g. sea pens and anemones), and a variety of crustaceans, molluscs, brachiopods, and sponges (Kuhn et al., 2021). Invertebrate prey serve as a forage base for larger piscine predators, some of which are commercially harvested, and include a variety of flatfishes (e.g., Dover and rex sole), thornyheads, sablefish, and hagfishes. Structure-forming invertebrates such as corals and sponges provide both habitat and food for other species. At all depths, fish assemblages at rock outcrops consist primarily of rockfishes (*Sebastes* spp.; Allen et al., 2006). Within the WEA, thornyheads (*Sebastalobus* spp.) dominate (Kuhn et al., 2021). Special habitats in the region include bacterial mats, submarine canyons, and pockmark fields (Marsaglia et al., 2019; Kuhn et al., 2021; Walton et al., 2021). No chemosynthetic communities were observed in the WEA (Kuhn et al. 2021).

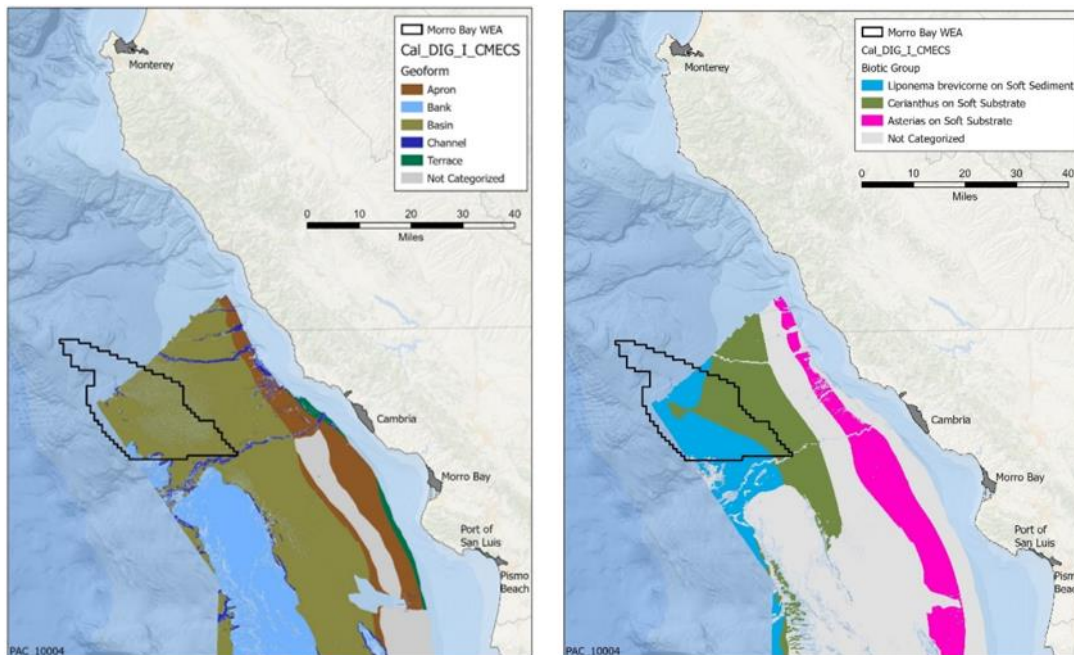


Figure 3-5: Seafloor Features (Geoforms, left) and Statistically Distinct Biological-based Soft Sediment Habitats (Biotic Group, right) Offshore Central California

Source: Cochrane et al. (2022)

3.4.1.2 Pelagic Environments

This ecosystem is defined in this document as all open water habitat seaward of coastal habitats. Phytoplankton and zooplankton communities in the region are diverse and vary according to depth, season and oceanographic conditions. Arthur D. Little, Inc. (1985) further described these communities, and the California Cooperative Oceanic Fisheries Investigations maintains datasets that describe decadal patterns of oceanographic and plankton trends (Rebstock, 2003). The pelagic environment also hosts a variety of larger animals including jellyfishes, krill, macro-invertebrate and fish larvae, forage fishes (e.g., myctophids, etc.), squid, tuna, sharks, marine mammals and sea turtles.

3.4.1.3 Coastal and Intertidal Habitats

The coastal zone is defined in this document as benthic and water column habitats and species that reside seaward of intertidal habitats and out to the 100 m (328 ft) delineation depth. Intertidal habitats are defined as the interface between terrestrial and marine zones. Two types of intertidal habitats exist: soft sediments (e.g., sandy and cobble beaches, mudflats, etc.), and hard substrate (e.g., rocky outcrops, human-made structures such as rock walls, etc.). Key references that summarize details concerning regional coastal habitats are contained within the California Ocean Science Trust and California Department of Fish and Wildlife (2013) document. Coastal features that are Habitat Areas of Particular Concern (HAPC, a type of essential fish habitat) include rocky reefs, kelp forests, and seagrass beds. Of particular regional significance is Morro Bay Estuary, a 2,300 ac area where freshwater flowing from the land mixes with the saltwater of the sea. The estuary environment encompasses salt and freshwater marshes, intertidal mud flats, eelgrass beds, and other subtidal habitats. It is one of least disturbed wetland system on the central and southern California coast, and is the second-largest enclosed bay in California.

3.4.1.3.1 Threatened and Endangered Species

Five taxa that occur or potentially occur in the region’s coastal and marine habitats are listed as either threatened or endangered under the Endangered Species Act (ESA) (Table 3-3). All these listed species are expected to be very rare in the WEA and are not further discussed.

Table 3-3: Taxa Listed as Threatened and Endangered under the ESA

Common Name	Scientific Name	Federal Status
Black abalone	<i>Haliotis cracherodii</i>	Endangered
Green sturgeon, Southern DPS	<i>Acipenser medirostris</i>	Threatened
Steelhead	<i>Oncorhynchus mykiss</i>	
South-Central California Coast Steelhead		Endangered
Southern California DPS		Threatened
Tidewater goby	<i>Eucycloglobius newberryi</i>	Threatened

3.4.2 Impacts of the Proposed Action

A metocean buoy is estimated to disturb a maximum of 2.3 m² (25 ft²) of sea floor from its solid cast iron anchor (PNNL 2019). Impacts to the outer shelf and upper slope habitats, including essential fish habitat (EFH), would be crushing or smothering of organisms by an anchor. Sediment suspension by anchor placement would cause temporary turbidity in the water column and could interfere with filter feeding invertebrates and the respiration and feeding of fishes. Physical sampling methods (grab samplers, benthic sleds, bottom cores, deep borings) may disturb, injure, or cause mortality to benthic resources and EFH in the immediate sampling area. Data collection buoys and associated mooring systems may act as small artificial reefs situated within an area that may exclude fishing (see discussion in Section 3.7), and this may provide a benefit to local benthic and fish assemblages associated with hard substrate. Decommissioning of the buoy may create short-term sediment suspension and will remove the artificial reef effect.

In the unlikely event of recovering lost equipment, seafloor disturbance would be expected during the recovery operation. Impacts to the outer shelf and upper slope habitats, including EFH, would be crushing or smothering of organisms by the dragging of grapnel lines to retrieve the lost item(s). If a vibracore rod cannot be retrieved, there would be additional bottom disturbance during the cutting and capping of the rod.

3.4.2.1 Pelagic Environments

Noise from HRG surveys and Project vessels may alter fish behavior within the WEA, but the effect will be temporary, and is not expected to affect viability of regional fish or invertebrate populations (Staaterman, unpublished data).

3.4.2.2 Coastal and Intertidal Habitats

Impacts to benthic resources in coastal habitats are not expected for site assessment and site characterization activities. Any impacts that could occur would be from accidental events, such as vessel grounding or collision. Impacts to fishes and essential fish habitat (EFH) may occur from noise generated by Project vessels and potential introduction of invasive species from non-local Project vessels. Impacts to benthic resources, EFH, and fishes in intertidal habitats are not expected for site assessment and site

characterization activities. Any impacts that could occur would be from accidental events, such as vessel grounding or collision

3.4.2.3 *Threatened and Endangered Species*

The regional population viability of species listed in Table 3-3 is not expected to be adversely affected by IPFs associated with the Proposed Action, and thus no additional conservation measures are proposed.

Conclusion

Impacts to benthic resources would be limited to the immediate footprint of the anchors or direct sampling. Sediment suspension would be temporary and short-term. Noise impacts from HRG surveys and Project vessels to EFH and fishes would be minimal and temporary in duration. The artificial reef effect may provide a local, short-term (less than 5 years) benefit to fish populations.

3.4.3 No Action Alternative

Under this alternative, commercial leases and grants would not be issued in the Morro Bay WEA. However, BOEM expects ongoing activities and planned actions to have continuing regional impacts on marine and coastal habitats and associated biotic assemblages over the timeframe considered in this EA. Urban development, mariculture, shipping and vessel discharges, and dredging will continue to contribute to climate change and will have commensurate negative impacts on marine and coastal habitats and associated biotic assemblages. Implementation of the No Action Alternative would not meaningfully reduce ongoing impacts to coastal habitats and associated biotic assemblages from existing and potential future actions.

3.5 MARINE MAMMALS AND SEA TURTLES

3.5.1 Affected Environment

There are approximately 39 species of marine mammal species known to occur in California waters including 8 baleen whale, 25 toothed whale and dolphin species, 6 species of seals and sea lions, and the northern and southern sea otter. Four listed species of sea turtles may occur in waters offshore California. Detailed species descriptions, including state, habitat ranges, population trends, predator/prey interactions, and species-specific threats are described in H.T. Harvey & Associates (HT Harvey & Associates 2020). These documents are incorporated by reference, and a summary of relevant information and conclusions for marine mammals and sea turtles is provided below.

Species that are unlikely to be present in the Proposed Action Area – due to its being outside of these species' current and expected range of normal occurrence – will not be considered further in this document. Biologically Important Areas for Blue, Humpback, and Gray Whales and Resident Areas for Harbor Porpoise fall outside of the Morro Bay WEA (Calambokidis et al. 2015).

The following marine species have been documented using migratory corridors or biologically important areas or have critical habitat in proximity to the Morro Bay WEA (Table 3-4). None of these species are expected to occur within the Morro Bay WEA in high densities.

North Pacific Right Whales (listed as Endangered under the ESA): Outside of the Bering Sea and Gulf of Alaska, from 1950- 2001, there have been at least four sightings of North Pacific right whales from the eastern population from Washington, 12 from California, 3 from Hawaii, 1 from British Columbia, and 2

from Baja California, Mexico. More recently, one North Pacific right whale was seen off La Jolla, California in April 2017, and a different animal was sighted off the Channel Islands in May 2017. Farther north, there were two sightings off British Columbia in 2013 and one in June 2018. Sightings have occurred in Mexican waters and thus there is some evidence that North Pacific right whales travel through California waters to reach Southern California or Mexico in the summer months, though by what route and in what number species utilize this unconfirmed migratory route is unknown. Critical habitat in the Bering Sea and Gulf of Alaska was designated in 2008 (73 FR 19000). Low numbers of sightings of individuals from a very small population makes any kind of demographic analysis challenging. Current knowledge of the low number of sightings offshore California in the last 68 years (14 sightings from 1950–2018, even with increased survey efforts), and the small population size (approximately 31 individuals), indicates that North Pacific right whales are unlikely to be present in the Morro Bay WEA.

Blue Whales (listed as Endangered under the ESA): Although feeding also occurs further to the north and south of the U.S. west coast, it remains an important feeding area for blue whales in the summer and fall. As such, nine biologically important areas have been identified, including three areas in central California. Most of this Eastern North Pacific Stock is thought to migrate south to take advantage of high productivity in the waters of Baja California, the Gulf of California, and the Costa Rica Dome during the winter and spring. The amount of blue whale habitat that overlaps with the Morro Bay WEA varies according to the data source; however, no blue whale BIAs or core use areas overlap with the Morro Bay WEA.

Fin Whales (listed as Endangered under the ESA): Fin whales occur in both pelagic and coastal waters, where they feed primarily on krill and fish. Current research suggests that only some fin whales undergo long distance migrations, with some individuals remaining resident in warmer waters of the Southern California Bight. The variability in movements make BIAs difficult to define and thus none are yet defined. Satellite-tracked fin whales seemed to favor nearshore habitats along the mainland coast, and in the northern Catalina basin in autumn and winter, and then disperse to the outer waters of the Southern California Bight, offshore and further north in spring and summer. Habitat suitability models suggest the Morro Bay WEA falls within suitable fin whale summer and fall habitat (average density of 0.0071–0.700 whales per 10 km²), with lower habitat suitability/occurrence in the spring and winter.

Humpback Whales (listed as Endangered under the ESA): Humpback whales undertake two migrations per year between mostly polar, cold water, feeding grounds in the summer months, and sub-tropical mating and calving grounds in the winter months. During these migrations in the Pacific, concentrations of humpback whales increase with proximity to shore. Although the Morro Bay WEA does not overlap with humpback whale feeding BIAs, critical habitat was designated for the Central America and Mexico Distinct Population Segments (DPS) in April 2021 (86 FR 21082), encompassing much of the West Coast of the U.S. The Morro Bay WEA comprises approximately 0.3% of this critical habitat. NOAA Southwest Fisheries Science Center (SWFSC) density models, which are based on ship-based surveys, predict that humpback whales are likely to occur in the Morro Bay WEA (0.0006-1 whale per 10 km² or 5-8% of the Central American DPS, or 1% of the entire population).

Gray Whales (listed as Endangered under the ESA): Gray whale feeding BIAs occur on the OCS and in coastal nearshore waters further north of the Morro Bay WEA, primarily in Washington and Oregon. As such, the WEA does not overlap with gray whale feeding BIAs. Similarly, migratory corridors occur close to shore (within 5.4 nmi). It is important to note that in defining migratory BIAs, Calambokidis et al. (2015) included a 25.4-nmi buffer for gray whales. The buffer represents the potential path of some individuals that move farther offshore during annual gray whale migrations.

Harbor Porpoise: Biologically important areas for two harbor porpoise stocks are located in Central and Northern California. The most southern of these is the Morro Bay resident biologically important area (for the Morro Bay Stock) which extends from Point Sur to Point Conception and from land to the 200-m isobath, although the vast majority of harbor porpoise seen in California were recorded within the 0–50 fathom (91 m) depth range. Genetic analyses have shown that the various stocks are genetically dissimilar and do not interbreed or migrate. The Morro Bay Stock is estimated between 2,737–4,255 animals. The Morro Bay WEA does not overlap with harbor porpoise habitat.

Northern Elephant Seals: These seals breed and give birth, primarily on offshore islands, in California and Baja California (Mexico). Males migrate to the Gulf of Alaska and western Aleutian Islands along the continental shelf to feed on benthic prey species, whereas females migrate to more pelagic areas in the Gulf of Alaska and the central North Pacific to feed on pelagic prey. Adults remain on land between March and August to molt. The Piedras Blancas Rookery is located further north on the San Simeon shores, where large numbers of seals are seen in January, April and October, and a haul out site is at Santa Rosa Island further to the south. Results of a tagging study suggest that there is potential for Northern elephant seals to occur in small numbers around the Morro Bay WEA.

Leatherback Sea Turtles (listed as Endangered under the ESA): Leatherback sea turtles have the most extensive range of any living reptile and have been reported circumglobally throughout the oceans of the world. Migratory routes of leatherbacks are not entirely known. However, turtles tagged after nesting in July at Jamursba-Medi, Indonesia, arrived in waters off California and Oregon during July–August coincident with the development of seasonal aggregations of jellyfish. Other studies similarly have documented leatherback sightings along the Pacific coast of North America during the summer and fall months, when large aggregations of jellyfish form. NMFS published a final rule designating critical habitat for leatherback sea turtles in 2012 (77 FR 4169). This critical habitat contains the main feeding habitat for leatherback sea turtles and stretches along the California coast from Point Arena to Point Arguello east of the 3,000-meter depth contour; and 25,004 mi² (64,760 km²) stretching from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000-m depth contour. The Morro Bay WEA does occur within a small portion of feeding critical habitat for leatherback sea turtles, however this area is not anticipated to have high numbers of leatherback sea turtle occurrence.

Table 3-4: Protected Marine Mammal and Sea Turtle Species Expected to Occur in the Project Area

Baleen Whales

Common name	Scientific Name	Stock	ESA/MMPA Status	Occurrence
Blue whale ³	<i>Balaenoptera musculus</i>	Eastern North Pacific	Endangered/Depleted	Late summer and fall
Fin whale ³	<i>Balaenoptera physalus</i>	California, Oregon, and Washington	Endangered/Depleted	Year round
Sei whale ³	<i>Balaenoptera borealis</i>	Eastern North Pacific	Endangered/Depleted	Uncommon
Minke whale ³	<i>Balaenoptera acutorostrata</i>	California, Oregon, and Washington	-	Occasional
Humpback whale	<i>Megaptera novaeangliae</i>	California, Oregon, and Washington (Central American DPS and Mexico DPS)	Endangered/Threatened	Spring to fall
North Pacific Gray Whale ³	<i>Eschrichtius robustus</i>	Eastern North Pacific	-	Oct-Jan and March-May

Toothed and Beaked Whales

Common name	Scientific Name	Stock	ESA/MMPA Status	Occurrence
Sperm whale ³	<i>Physeter macrocephalus</i>	California, Oregon, and Washington	Endangered/Depleted	Year round
Killer whale	<i>Orcinus orca</i>	Eastern North Pacific Transient/ West Coast Transient ¹	-	Sporadic
Killer whale – southern resident	<i>Orcinus orca</i>	Sothern Resident	Endangered	Uncommon
Baird's beaked whale	<i>Berardius bairdii</i>	California, Oregon, and Washington	-	
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	California, Oregon, and Washington	-	Uncommon
Stejneger's beaked whale	<i>Mesoplodon stejnegeri</i>	California, Oregon, and Washington	-	
Risso's dolphin	<i>Grampus griseus</i>	California, Oregon, and Washington	-	Year round
Rough-toothed dolphin	<i>Steno bredanensis</i>	N/A ²	-	
Northern right whale dolphin	<i>Lissodelphis borealis</i>	California, Oregon, and Washington	-	Year round
Pacific white-sided dolphin	<i>Lagenorhynchus obliquidens</i>	California, Oregon, and Washington	-	Year round
Dall's porpoise	<i>Phocoenoides dalli</i>	California, Oregon, and Washington	-	Year round
Harbor porpoise	<i>Phocoena phocoena</i>	Morro Bay stock	-	Late Spring to early fall

Sea Lions and Seals

Common name	Scientific Name	Stock	ESA/MMPA Status	Occurrence
Steller sea lion	<i>Eumetopias jubatus</i>	Eastern DPS	De-listed with critical habitat	Year round
California sea lion	<i>Zalophus californianus</i>	U.S. Stock	-	Year round
Northern elephant seal	<i>Mirounga angustirostris</i>	California	-	Year round
Harbor seal	<i>Phoca vitulina richardsi</i>	California	-	Year round
Guadalupe fur seal ³	<i>Arctocephalus townsendi</i>	Throughout its range	Threatened	Spring/Summer, seasonal low numbers

Sea Turtles

Common name	Scientific Name	Stock	ESA/MMPA Status	Occurrence
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Throughout range	Endangered	Uncommon

Notes:

DPS refers to Distinct Population Segment as defined under the ESA.

¹ This stock is mentioned briefly in the Pacific Stock Assessment Report (Carretta et al., 2016; 2018) and referred to as the “Eastern North Pacific Transient” stock, however, the Alaska Stock Assessment Report contains assessments of all transient killer whale stocks in the Pacific and the Alaska Stock Assessment Report refers to this same stock as the “West Coast Transient” stock (Muto et al., 2016; 2018).

² Rough-toothed dolphin has no recognized stock for the U.S West Coast.

³ Critical habitat has not been designated for these ESA-listed species.

ESA = Endangered Species Act

MMPA = Marine Mammal Protection Act

3.5.2 Impacts of the Proposed Action

The potential impacts for marine mammals and sea turtles associated with the Proposed Action include noise from HRG and geotechnical surveys, the potential for collision with project-related vessels, and potential entanglement in mooring systems associated with the installation of a metocean buoy.

BOEM directs lessees to incorporate best management practices into their plans. These have been developed through years of conventional energy operations and refined through BOEM’s renewable energy program and consultations with NMFS, including vessel strike avoidance measures, visual monitoring, and shutdown and reporting. These measures, which will minimize or eliminate potential effects from site assessment and site characterization activities to protected marine mammal and sea turtle species, are found in Appendix D.

3.5.2.1 HRG Surveys

For a sound to be potentially disturbing, it must be able to be heard by the animal. Effects on hearing ability or disturbance can result in disturbance of important biological behaviors such as migration, feeding, resting, communication, and breeding. Baleen whales hear lower frequencies, sperm whales, beaked whales and dolphins hear mid-frequencies, porpoise hear high frequencies (Table 3-5), seals from 50 Hz to 86 kHz, and sea lions from 60 Hz to 39 kHz (NMFS, 2016, 2018). Sea turtles are low frequency hearing specialists with a range of maximum sensitivity between 100 to 800 Hz (Ridgway et al., 1969; Lenhardt, 1994; Bartol et al., 1999; Lenhardt, 2002; Bartol and Ketten, 2006) (Table 3-5).

The assessment of potential hearing effects in marine mammals is based on NMFS' technical guidance for assessing acoustic impacts, defined as Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) (NMFS, 2018; 3-4). PTS results in permanent hearing loss while TTS is a temporary loss in hearing function related to the exposure level and durations. The methodology developed by the U.S. Navy is currently thought to be the best available data to evaluate the effects of exposure to the survey noise by sea turtles that could result in physical effects (NMFS, 2021; US Navy, 2017; Table 3-5).

Table 3-5: Impulsive Acoustic Thresholds Identifying the Onset of PTS and TTS for Marine Mammals and Sea Turtle Species

Hearing Group	Generalized Hearing Range	Permanent Threshold Shift Onset	Temporary Threshold Shift Onset
Low frequency (e.g., Baleen Whales)	7 Hz to 35 kHz	219 dB Peak 183 dB cSEL	213 dB Peak 179 cSEL
Mid-frequency (e.g., Dolphins and Sperm Whales)	150 Hz to 160 kHz	230 dB Peak 185 dB cSEL	224 dB Peak 178 dB cSEL
High frequency (e.g., porpoise)	275 Hz to 160 kHz	202 dB Peak 155 dB cSEL	148 dB Peak 153 dB cSEL
Phocid pinnipeds (true seals) (underwater)	50 Hz to 86 kHz	218 dB Peak 185 dB cSEL	212 dB Peak 181 dB cSEL
Otariid pinnipeds (sea lions and fur seals) (underwater)	60 Hz to 39 kHz	232 dB Peak 203 dB cSEL	226 dB Peak 199 dB cSEL
Sea Turtles	30 Hz to 2 kHz	230 dB Peak 204 dB cSEL	226 dB Peak 189 dB cSEL

Notes:

Sources: mammals: NMFS (2018); sea turtles: US Navy (2017)

cSEL = cumulative sound exposure level

dB = decibels

Hz = hertz

kHz = kilohertz

Source levels and frequencies of HRG equipment were measured under controlled conditions and represent the best available information for HRG sources (Crocker and Fratantonio, 2016). Using 19 HRG source levels (excluding side-scan sonars operating at frequencies greater than 180 kHz, and other equipment that is unlikely to be used for data collection/site characterization surveys associated with offshore renewable energy) with NOAA's sound exposure spreadsheet tool, injury (PTS) and disturbance ranges were calculated for listed species. To provide the maximum impact scenarios, the highest power levels and most sensitive frequency setting for each hearing group was used. A geometric spreading model, together with calculations of absorption of high frequency acoustic energy in sea water, when appropriate, was used to estimate injury and disturbance distances for listed marine mammals. The spreadsheet and geometric spreading models do not consider the tow depth and directionality of the sources; therefore, these are likely overestimates of actual injury and disturbance distances. All sources were analyzed at a tow speed of 2.315 meters per second (m/s) (4.5 kn), based on the same activities in the Atlantic (Baker and Howson 2021).

Potential for injury: For marine mammal species expected to occur in the Proposed Action Area, PTS distances are generally small ranging from 0–47 m (0-154 ft). The largest possible PTS distance is 251.4 m (825 ft) for porpoise species, only when the 100 MHz multi-beam echosounder is used (Table 3-6). However, this range is likely an overestimate since it assumes the unit is operated in full power mode, that it is an omnidirectional source, and absorption of sound over distance is not taken into account. With the requirements for qualified Protected Species Observers (PSOs) to monitor a 1,000 m (3,280 ft) monitoring zone, for vessels to maintain 500 m (1,640 ft) from marine mammals, as well as the

shutdown requirements when ESA-listed marine mammal species are sighted within 500 m, BOEM believes that the risk of PTS occurring in any protected marine mammal species from HRG surveys is discountable.

PTS exposure thresholds (calculated for 204 cSEL and 23 dB peak criteria (Navy 2017) are higher for sea turtles than for marine mammals, and based on the source characteristics, are not likely to result in PTS. The predicted distances from these mobile sound sources indicate the sound sources are transitory and have no risk of exposure to levels of noise that could result in PTS for sea turtles (NMFS 2021).

Table 3-6: Summary of PTS Exposure Distances for Protected Marine Mammal Species from Mobile HRG Sources Towed at a Speed of 4.5 Knots

Mobile, Impulsive, Intermittent Sources

HRG Source	DISTURBANCE DISTANCE (m)						
	Highest Source Level (dB re 1 μ Pa)	Low Frequency (e.g., Baleen Whales) ¹	Mid-Frequency (e.g., Dolphins and Sperm Whales) ¹	High Frequency (e.g., Porpoise)	Phocids (True Seals)	Otariids (Sea Lions and Fur Seals)	Sea Turtles
Boomers, Bubble Guns (4.3 kHz)	176 dB SEL 207 dB RMS 216 peak	0.3	0	5.0	0.2	0	0
Sparkers (2.7 kHz)	188 dB SEL 214 dB RMS 225 peak	12.7	0.2	47.3	6.4	0.1	0
CHIRP Sub-Bottom Profilers (5.7 kHz)	193 dB SEL 209 dB RMS 214 peak	1.2	0.3	35.2	0.9	0	NA

Mobile, Non-Impulsive, Intermittent Sources

HRG SOURCE	DISTURBANCE DISTANCE (m)						
	Highest Source Level (dB re 1 μ Pa)	Low Frequency (e.g., Baleen Whales) ¹	Mid-Frequency (e.g., Dolphins and Sperm Whales) ¹	High Frequency (e.g., Porpoise)	Phocids (True Seals)	Otariids (Sea Lions and Fur Seals)	Sea Turtles
Multibeam echosounder (100 kHz)	185 dB SEL 224 dB RMS 228 peak	0	0.5	251.4*	0	0	NA
Multibeam echosounder (>200 kHz)	182 dB SEL 218 dB RMS 223 peak	NA	NA	NA	NA	NA	NA
Side-scan sonar (>200 kHz)	184 dB SEL 220 dB RMS 226 peak	NA	NA	NA	NA	NA	NA

Notes:

^a PTS injury distances for listed marine mammals were calculated with NOAA's sound exposure spreadsheet tool using sound source characteristics for HRG sources in Crocker and Fratantonio (2016).

* This range is conservative as it assumes full power, an omnidirectional source, and does not consider absorption over distance.

NA = not applicable due to the sound source being out of the hearing range for the group.

RMS = root mean square SEL = sound exposure level

Potential for disturbance: Using the same sound sources as for the PTS analysis, the disturbance distances to 160 dB re 1 μ Pa RMS for marine mammals and 175 dB re 1 μ Pa RMS for sea turtles were calculated using a spherical spreading model (20 LogR). These results describe maximum disturbance exposures for protected species to each potential sound source (Table 3-7).

The disturbance distances depend on the equipment and the species present. The range of disturbance distances for all protected species expected to occur in the Proposed Action Area is from 40–502 m (131–1,647 ft), with sparkers producing the upper limit of this range. Visual monitoring requirements of a 500 m (1,640 ft) exclusion zone for ESA-listed large whales will ensure that any potential impacts to these species from noise generated by HRG survey equipment will be reduced to negligible to minor levels. Disturbance distances to protected species are conservative, as explained above, and any behavioral effects will be intermittent and short in duration and are expected to result in negligible effects.

Table 3-7: Summary of Maximum Disturbance Distances (in meters) for Protected Marine Mammal Species from Mobile HRG Sources Towed at a Speed of 4.5 Knots

Mobile, Impulsive, Intermittent Sources

HRG SOURCE	DISTURBANCE DISTANCE (m)					
	Low Frequency (e.g., Baleen Whales) ¹	Mid-Frequency (e.g., Dolphins and Sperm Whales) ¹	High Frequency (e.g., Porpoise)	Phocids (True Seals)	Otariids (Sea Lions and Fur Seals)	Sea Turtles
Boomers, Bubble Guns (4.3 kHz)	224	224	224	224	224	40
Sparkers (2.7 kHz)	502	502	502	502	502	90
CHIRP Sub-Bottom Profilers (5.7 kHz)	282	282	282	282	282	50

Mobile, Non-Impulsive, Intermittent Sources

HRG SOURCE	DISTURBANCE DISTANCE (m)					
	Low Frequency (e.g., Baleen Whales) ¹	Mid-Frequency (e.g., Dolphins and Sperm Whales) ¹	High Frequency (e.g., Porpoise)	Phocids (True Seals)	Otariids (Sea Lions and Fur Seals)	Sea Turtles
Multibeam Echosounder (100 kHz)	NA	370	370	NA	NA	NA
Multibeam Echosounder (>200 kHz)	NA	NA	NA	NA	NA	NA
Side-scan Sonar (>200 kHz)	NA	NA	NA	NA	NA	NA

Notes:

^a PTS injury distances for listed marine mammals were calculated with NOAA's sound exposure spreadsheet tool using sound source characteristics for HRG sources in Crocker and Fratantonio (2016).

NA = not applicable due to the sound source being out of the hearing range for the group.

3.5.2.2 *Geotechnical Surveys*

Geotechnical surveys (vibracores, piston cores, gravity cores) related to offshore renewable energy activities are typically numerous, but very brief, sampling activities that introduce relatively low levels of sound into the environment. General vessel noise is produced from vessel engines and dynamic positioning to keep the vessel stationary while equipment is deployed, and sampling conducted. Recent analyses of the potential impacts to protected species exposed to noise generated during geotechnical survey activities determined that effects to protected species from exposure to this noise source are extremely unlikely to occur (NMFS, 2021).

3.5.2.3 *Project-related Vessel Traffic*

The total number of round trips for project-related vessels over a 3-year period will range from 150-555 assuming 24-hour operations, and 464-873 assuming 10-hour daily operations. An additional 21–30 round trips will be conducted over a 5-year period for the deployment, maintenance, and decommissioning of 3 metocean buoys. Vessel speeds during site characterization surveys within the Proposed Action Area will be limited to less than 5 knots (2.57 m/s), but transit speeds will vary. Considering the current annual level of vessel traffic around the Proposed Action Area (see Section 3.4), including tug and tows, cargo ships and tankers, the project-related vessel traffic would increase the overall vessel traffic and risk of collision with marine mammals in the Proposed Action Area; however the required vessel strike avoidance measures, as well as reporting requirements (Appendix D), will result in minor to negligible impacts to protected species (Rockwood et al 2017; 2020; NMFS 2021).

3.5.2.4 *Entanglement*

Most entanglements are never observed, but there are many cases of entangled whales with unidentified gear (International Whaling Commission, 2016). There are reports of large whales (including humpback, right, and fin whales) interacting with anchor moorings of yachts and other vessels, towing small yachts from their moorings or becoming entangled in anchor chains, sometimes with lethal consequences (Anonymous 2012; Richards 2012; Kerr 2013; Love 2013). Animals may swim into moorings accidentally or actively seek out anchor chains or boats as a surface to scratch against (Benjamins, 2014).

An extensive literature review of mooring systems proposed for marine renewable energy devices suggested that for these systems the risk is relatively modest, especially when compared to fisheries entanglements (Benjamins, 2014). Taut mooring configurations have the lowest relative risk of entanglement, while catenary moorings with slack or float lines or accessory buoys present the highest risk (Harnois, 2015). Even for lines under tension, moored devices pose an increasing risk of entanglement for animals with longer body length, rigidity of the animal, and mode of feeding with mouths open (Benjamins, 2014) – which are all characteristics of large whales. However, regardless of the mooring configuration, the absolute risk of entanglement is found to be low (Harnois, 2015).

The PNNL deployed two LiDAR metocean buoys—one in the Proposed Action Area and one in the Humboldt WEA (PNNL, 2019). Including the multiple metocean buoys deployed along the NE Atlantic coast associated with site assessment activities, no incidents of entanglement have been reported to date. BOEM continues to work with lessees and requires the use of the best available mooring systems, using the shortest practicable line lengths, anchors, chain, cable, or coated rope systems, to prevent or reduce to discountable levels any potential entanglement or entrainment of marine mammals and sea turtles. BOEM will review each buoy design to ensure that reasonable low risk mooring designs are used.

Potential impacts on protected marine mammal species from entanglement related to buoy operations are thus expected to be discountable.

3.5.2.5 Impacts to Critical Habitat

Effective May 21, 2021, NMFS issued an updated final rule to designate critical habitat for the endangered Central America Distinct Population Segment (DPS), and the threatened Mexico DPS of humpback whales (*Megaptera novaeangliae*) (86 CFR 21082). Critical habitat for these DPSs serve as feeding habitat and contain the essential biological feature of humpback whale prey. Critical habitat for the Central America DPS of humpback whales contains approximately 48,521 nmi² of marine habitat in the North Pacific Ocean within the portions of the California Current Ecosystem off the coasts of Washington, Oregon, and California. Specific areas designated as critical habitat for the Mexico DPS of humpback whales contain approximately 116,098 nmi² of marine habitat in the North Pacific Ocean, including areas within portions of the eastern Bering Sea, Gulf of Alaska, and California Current Ecosystem. The Morro Bay WEA consists of approximately 284 nmi² and overlaps with humpback whale critical habitat. Any displacement of prey species as a result of surveys conducted as part of the Proposed Action are anticipated to be short-term and temporary and are not anticipated to destroy or adversely modify critical habitat.

Conclusion

Due to the nature of the proposed activities, as well as the mitigative strategies BOEM assumes operators will employ during activities associated with the Proposed Action (described in detail in Appendix D), the impacts to critical habitat and protected marine mammal and sea turtle species from site assessment and site characterization activities related to noise from HRG and geotechnical surveys, collisions with project-related vessels, and entanglement in metocean buoy moorings, are anticipated to range from negligible to minor.

3.5.3 No Action Alternative

Of the approximately 39 species of marine mammals known to occur in California waters, 22 marine mammal and a single sea turtle species (leatherback sea turtle) are likely to occur within the project area. Seven of these species (blue, fin, sei, humpback, gray, sperm whales and leatherback sea turtles) are listed as endangered under the ESA and the Guadalupe fur seal is listed as threatened. Detailed species descriptions, including status, habitat ranges, population trends, predator/prey interactions, and species-specific threats are described in H.T. Harvey & Associates (2020); this document is incorporated by reference.

Marine mammals and sea turtles in the Project Area are subject to a variety of ongoing anthropogenic impacts that overlap with the Proposed Action including collisions with vessels (ship strikes), entanglement, fisheries bycatch, anthropogenic noise, disturbance of marine and coastal environments, effects on benthic habitat, and climate change (Carretta et al. 2021). Climate change has the potential to impact the distribution and abundance of marine mammal prey due to changing water temperatures, ocean currents, and increased acidity (Meyer-Gutbrod et al. 2021); (Sydeman et al. 2015). Additionally, bottom trawling and benthic disruption have the potential to result in impacts on prey availability and distribution.

Under this alternative, commercial leases and grants would not be issued in the Morro Bay WEA and the negligible to minor impacts to marine mammals and sea turtles from the Proposed Action, will not

occur. However, BOEM expects ongoing activities and planned actions to have continuing regional impacts on marine mammal and sea turtle species over the timeframe considered in this EA.

3.6 COASTAL AND MARINE BIRDS

3.6.1 Affected Environment

The marine and coastal bird population off central California is both diverse and complex, being composed of as many as 165 species (eBird, 2022). Of the many different types of birds that occur in this area, three groups are generally the most sensitive to the potential impacts of the Proposed Action: marine birds (e.g., loons, grebes, shearwaters, storm-petrels, cormorants, gulls, terns and alcids), waterfowl (geese and ducks), and shorebirds (e.g., plovers and sandpipers). While some of these species breed in the area, others may spend their non-breeding or “wintering” period there or may simply pass through during migration. This analysis considers Morro Bay and its shorelines, and the offshore cable routes and WEA.

Nearshore species generally occupy relatively shallow waters inshore of the continental slope waters. These species spend almost their entire time on the water surface. In the Proposed Action Area, the most common nearshore species are Red-throated, Pacific and Common Loons (*Gavia stellata*, *G. pacifica*, and *G. immer*); Western Grebes (*Aechmophorus occidentalis*); Surf and White-winged Scoters (*Melanitta perspicillata* and *M. deglandi*); Brandt’s and Pelagic Cormorants (*Phalacrocorax penicillatus* and *P. pelagicus*). Other species associated with nearshore waters include nearshore terns such as summering Caspian Terns (*Hydroprogne caspia*) and postbreeding Elegant Terns (*Thalasseus elegans*). Brown Pelicans (*Pelecanus occidentalis*) are another common postbreeding visitor in nearshore waters. Several species of gulls and Common Murres (*Uria aalge*) are abundant seasonally in nearshore waters, and Red-necked (*Phalaropus lobatus*) and Red (*Phalaropus fulicarius*) phalaropes occur during migration. The Marbled Murrelet (*Brachyramphus marmoratus*), listed as threatened under Federal Endangered Species Act and endangered under the California Endangered Species Act (CESA), breeds in coastal old growth forests north of Monterey Bay but disperses south to the nearshore waters off the San Luis Obispo County coastline. In central California, nearshore species occur in highest numbers during the winter months; relatively few remain during the summer except for those species that breed locally or disperse northward from southern breeding colonies in the summer.

Pelagic species generally occupy deeper waters over the continental shelf break (>200 m (656 ft)) and can occur in substantial densities far from shore (Ainley and Terrill 1996). These species spend much of their time on the water surface or diving for food. In the Proposed Action Area, common offshore species include Sooty, Pink-footed, Buller’s and Black-vented Shearwaters (*Ardenna griseus*, *A. creatopus*, *A. bulleri*, and *Puffinus opisthomelas*); Northern Fulmars (*Fulmarus glacialis*); and Pomarine, Parasitic, and Long-tailed Jaegers (*Stercorarius pomarinus*, *S. parasiticus*, and *S. longicaudus*). Shearwaters are found primarily in spring-fall, Northern Fulmars in winter, and jaegers during the spring and fall migrations. Species characteristic of the deepwater pelagic zone include several species of albatross including the Black-footed Albatross (*Phoebastria nigripes*), the rarer Laysan Albatross (*Phoebastria immutabilis*), and the rare and federally endangered Short-tailed Albatross (*Phoebastria albatrus*). Several species of alcids occur off central California including the Common Murre (*Uria aalge*), Cassin’s Auklet (*Ptychoramphus aleuticus*), and Rhinoceros Auklet (*Cerorhinca monocerata*). Nonbreeding South Polar Skuas (*Stercorarius maccormicki*) occur in the summer and fall. Offshore gulls and terns in this zone include Western Gulls (*Larus occidentalis*); migrating Sabine’s Gulls (*Xema sabini*), Common Terns (*Sterna hirundo*) and Arctic Terns (*Sterna paradisaea*); and wintering Short-billed Gulls

(*Larus canus*), California Gulls (*Larus californicus*), Herring Gulls (*Larus argentatus*), Glaucous-winged Gulls (*Larus glaucescens*), and Black-legged Kittiwakes (*Rissa tridactyla*). Gadfly petrels (*Pterodroma spp.*) are rare over deep pelagic waters beyond the continental shelf break and include the federally listed Hawaiian Petrel (*Pterodroma sandwichensis*), Cook’s Petrel (*Pterodroma cookii*), and Murphy’s Petrel (*Pterodroma ultima*). Although these species typically occur in deep water west of the Proposed Action area, they have all been observed over the continental shelf break on a number of occasions off central California (eBird, 2022 Jan 11, 2022).

In addition to seabirds, there are a number of waterbirds and shorebirds that occupy coastal and estuarine habitats in the vicinity of the Proposed Action. Morro Bay is an important wintering area for Black Brant (*Branta bernicla nigricans*), with as many as 5,000 occurring there (Chiple et al. 2003). Other waterfowl found from fall through spring include Canada Goose (*Branta canadensis*), Blue-winged Teal (*Spatula discors*), Cinnamon Teal (*Spatula cyanoptera*), Northern Shoveler (*Spatula clypeata*), Gadwall (*Mareca strepera*), American Wigeon (*Mareca americana*), Mallard (*Anas platyrhynchos*), Northern Pintail (*Anas acuta*), Green-winged Teal (*Anas crecca*), and Bufflehead (*Bucephala albeola*). Large numbers of shorebirds are present during much of the year with tens of thousands stopping over during migration (Chiple et al. 2003). Shorebirds wintering in large numbers include Marbled Godwits (*Limosa fedoa*), Willets (*Tringa semipalmata*), and Long-billed Curlews (*Numenius americanus*). Nearly 40 shorebird species use a variety of habitats in the Morro Bay area. Many of the locally occurring shorebirds are migratory in this area with the majority occurring during the spring and fall migrations and during the winter; very few shorebirds breed in this area. Although most shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also utilize other coastal habitats, including sandy beaches, rocky shores, and open ocean. Other common shorebird species in central California and the Proposed Action Area include American Avocets (*Recurvirostra americana*), Black Oystercatchers (*Haematopus bachmani*), Black-bellied Plovers (*Pluvialis squatarola*), Semipalmated Plovers (*Charadrius semipalmatus*), Whimbrels (*Numenius phaeopus*), Black Turnstones (*Arenaria melanocephala*), Surfbirds (*Calidris virgata*), Sanderlings (*Calidris alba*), Dunlins (*Calidris alpina*), Least Sandpipers (*C. minutilla*), Western Sandpipers (*Calidris mauri*), Short-billed and Long-billed Dowitchers (*Limnodromus griseus* and *L. scolopaceus*), and Greater Yellowlegs (*Tringa melanoleuca*). The federally threatened Western Snowy Plover (*Charadrius nivosus nivosus*) nests and winters on sandy beaches along the San Luis Obispo County coastline.

Several bird species that have the potential to occur within the Proposed Action Area have been afforded protected status by the state and/or federal governments due to declining populations and/or habitats. In addition, all native birds within the area are protected by the Migratory Bird Treaty Act of 1918, which is enforced by the U.S. Fish and Wildlife Service (USFWS). Special-status marine bird species found within the vicinity of the proposed activities are listed in Table 3-8 below.

Table 3-8: Special-Status Marine and Coastal Birds Within or Near the Project Area

Common Name	Scientific Name	Federal Status	State Status
Brant	<i>Branta bernicla</i>	-	SSC
Harlequin Duck	<i>Histrionicus histrionicus</i>	-	SSC
Black Oystercatcher	<i>Haematopus bachmani</i>	BCC	-
Mountain Plover	<i>Charadrius montanus</i>	BCC	SSC
Western Snowy Plover	<i>Charadrius nivosus nivosus</i>	T, BCC	SSC
Marbled Godwit	<i>Limosa fedoa</i>	BCC	-
Red Knot	<i>Calidris canutus</i>	BCC	-

Common Name	Scientific Name	Federal Status	State Status
Short-billed Dowitcher	<i>Limnodromus griseus</i>	BCC	-
Willet	<i>Tringa semipalmata</i>	BCC	-
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	T	E
Scripps's Murrelet	<i>Synthliboramphus scrippsi</i>	-	T
Guadalupe Murrelet	<i>Synthliboramphus hypoleucus</i>	BCC	T
Craveri's Murrelet	<i>Synthliboramphus craveri</i>	BCC	-
Ancient Murrelet	<i>Synthliboramphus antiquus</i>	BCC	-
Cassin's Auklet	<i>Ptychoramphus aleuticus</i>	-	SSC
Rhinoceros Auklet	<i>Cerorhinca monocerata</i>	-	WL
Tufted Puffin	<i>Fratercula cirrhata</i>	-	SSC
Heermann's Gull	<i>Larus heermanni</i>	BCC	-
Western Gull	<i>Larus occidentalis</i>	BCC	-
California Gull	<i>Larus californicus</i>	-	WL
California Least Tern	<i>Sternula antillarum browni</i>	E	E, FP
Laysan Albatross	<i>Phoebastria immutabilis</i>	BCC	-
Black-footed Albatross	<i>Phoebastria nigripes</i>	BCC	-
Short-tailed Albatross	<i>Phoebastria albatrus</i>	E	SSC
Fork-tailed Storm-Petrel	<i>Hydrobates furcatus</i>	-	SSC
Ashy Storm-Petrel	<i>Hydrobates homochroa</i>	BCC	SSC
Black Storm-Petrel	<i>Hydrobates melania</i>	BCC	SSC
Murphy's Petrel	<i>Pterodroma ultima</i>	BCC	-
Hawaiian Petrel	<i>Pterodroma sandwichensis</i>	E	-
Cook's Petrel	<i>Pterodroma cookii</i>	BCC	-
Buller's Shearwater	<i>Ardenna bulleri</i>	BCC	-
Pink-footed Shearwater	<i>Ardenna creatopus</i>	BCC	-
Black-vented Shearwater	<i>Puffinus opisthomelas</i>	BCC	-
Brandt's Cormorant	<i>Urile penicillatus</i>	BCC	-
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	-	WL
Brown Pelican	<i>Pelecanus occidentalis</i>	DE	DE, FP

Status: E = Endangered T = Threatened DE = Delisted (formerly Endangered) C = Candidate
 BCC = Bird of Conservation Concern SSC = Species of Special Concern WL = Watch List
 FP = Fully Protected

3.6.1.1 Threatened and Endangered Birds that could Occur in the Vicinity of the Proposed Project

Short-tailed Albatross. The Short-tailed Albatross (*Phoebastria albatrus*) was federally listed as endangered on June 2, 1970 (35 FR 8491). It is also a California species of special concern. This species is a large pelagic bird with long narrow wings adapted for soaring just above the water surface. As of 2020, 84 percent of the known breeding population uses a single colony, Tsubamezaki, on Torishima Island off Japan. The remaining population nests on other islands surrounding Japan, primarily the Senkaku Islands, and a single pair nested on Midway Atoll from 2008–2015. During the non-breeding season, the Short-tailed Albatross regularly ranges along the Pacific Rim from southern Japan to the Gulf of Alaska, primarily along continental shelf margins. It is rare to casual but increasing offshore from British Columbia to southern California (Howell 2012). All recent records along the west coast have been Stage 1 immatures (Howell 2012), which travel more broadly throughout the north Pacific than adults (USFWS 2014). Most individuals found off California in recent years have been during the fall and early winter

with a few records in late winter and early spring (Hamilton et al. 2007). The diet of this species is not well studied; however, research suggests at sea during the non-breeding season that squid, crustaceans, and fish are important prey (USFWS 2008).

The global population is currently estimated to be 7,365 birds (USFWS 2020). There have been 42 records of the species off California since 1977 with 38 records between 1998 and 2020; six of these are off the San Luis Obispo County coast (Tietz and McCaskie 2022). Based on satellite tracking of 99 individuals between 2002 and 2012, juveniles generally range in shallower, nearer-to-shore waters than adults (e.g., less than 200 m (656 ft) depth) and are more likely than adults to occur off the west coast of the U.S. and Canada (Deguchi et al. 2012; Suryan et al. 2008; Suryan et al. 2007; Suryan and Fischer 2010; Suryan et al. 2006; USFWS 2014). The extreme rarity of this species off the California coast indicates that the Short-tailed Albatross is highly unlikely to be in the offshore portions of the action area; its presence is anticipated to be limited to occasional occurrences even as the population continues to grow.

Hawaiian Petrel. The Hawaiian Petrel (*Pterodroma sandwichensis*) was federally listed as endangered on March 11, 1967 (32 FR 4001). The species breeds on larger islands in the Hawaiian chain where they nest in burrows on vegetated cliffs, volcanic slopes, and lava flows. The global population is comprised of approximately 52,186 individuals (95 percent Confidence Interval 39,823–67,379), including juveniles and subadults (Joyce 2013; USFWS 2017). The species is absent from Hawaiian waters from November to April when it disperses to the eastern tropical Pacific. Individuals have been recorded off Oregon and California from May to September with most records occurring during July and August (Howell et al. 2014). The first of California's 66 accepted records occurred in May 1992. Records of Hawaiian Petrels have increased such that they are no longer a review species for the California Bird Records Committee. Records were reviewed through 2013; one accepted record was off the San Luis Obispo County coast (Tietz and McCaskie 2022). A review of eBird shows five additional records along the shelf edge off San Luis Obispo County between 2011–2018 (eBird 2022 Jan 4, 2022). This species is typically encountered offshore in deep water, but occasionally individuals are observed over the continental shelf break. In addition to the rarity of the Hawaiian petrel off the California coast, the presence of this species in the offshore portions of the action area would likely be limited to rare occurrences.

Western Snowy Plover. The Pacific Coast population of the western snowy plover was listed as threatened on March 5, 1993 (58 FR 12864). The primary reasons for listing this population were loss and degradation of habitat, and human disturbance. A final recovery plan was signed August 13, 2007. Critical habitat for the species was originally designated in 1999 (64 FR 68507), revised in 2005 (70 FR 56970), and revised again in 2012 (77 FR 36728).

The Pacific Coast population of the Western Snowy Plover (*Charadrius nivosus nivosus*) breeds on the Pacific Coast from southern Washington to southern Baja California, Mexico. The bird is found on beaches, open mudflats, salt pans and alkaline flats, and sandy margins of rivers, lakes, and ponds. It nests in depressions in the sand above the drift zone on coastal beaches, sand spits, dune-backed beaches, sparsely vegetated dunes, beaches at creeks and river mouths, and salt pans at lagoons and estuaries. The breeding season extends from early March to late September, with birds at more southerly locations beginning to nest earlier in the season than birds at more northerly locations (64 FR 68507). In most years, the earliest nests on the California coast generally occur during the first to third week of March. Peak nesting in California occurs from mid-April to mid-June, while hatching lasts from early April through mid-August. There are eight designated critical habitat units for the Western Snowy Plover along the San Luis Obispo County coastline (77 FR 36728), and nesting has been observed at a

minimum of 14 locations along the coast with the highest numbers at the Morro Bay Sandspit and Oceano Dunes (USFWS unpublished survey data 2018).

In winter, the taxa are found on many of the beaches used for nesting as well as on beaches where they do not nest, in man-made salt ponds, and on estuarine sand and mud flats. The winter range is somewhat broader and may extend to Central America (Page et al. 1995). The majority of birds along the coast winter south of Bodega Bay, California (Page et al. 1986). This taxa may be found wintering at any beach with suitable habitat along the California coast, including several locations in the action area. Western Snowy Plovers were reported during winter surveys of beaches in San Luis Obispo County between 2003-2015, including San Simeon State Beach, Estero Bluffs State Beach, Morro Strand State Beach, Morro Bay Sandspit, and Ocean Dunes (USFWS unpublished survey data 2015, 2019).

Marbled Murrelet. The Marbled Murrelet (*Brachyramphus marmoratus*) was federally listed as threatened on October 1, 1992, within the states of Washington, Oregon, and California (57 FR 45328). Populations of the species in Alaska and British Columbia were not listed under the ESA. The Marbled Murrelet is a small seabird that spends most of its life in the nearshore marine environment, but nests and roosts inland in low-elevation old growth forests, or other forests with remnant large trees. Critical habitat for the species was designated on May 24, 1996 (61 FR 26256) and was later revised in a final rule published on October 5, 2011 (76 FR 61599). A final determination published on August 4, 2016 (81 FR 51348) determined that the critical habitat for the Marbled Murrelet, as designated in 1996 and revised in 2011, meets the statutory definition of critical habitat under the ESA. No marine areas were designated as critical habitat.

While the species does not nest in the vicinity of the project area, individuals from the population nesting in the Santa Cruz Mountains (and perhaps from more northerly populations) do disperse to the coast and offshore waters of San Luis Obispo County. Marantz (1986) characterized them as a rare transient and winter visitant offshore, but possibly regular in late summer in San Luis Obispo County. In a study where Marbled Murrelets nesting in the Santa Cruz Mountains were radiomarked (Peery et al. 2008), 3 of 46 birds (7 percent) radiomarked during the breeding season dispersed considerable distances (138–220 km, 86-137 mi) to the San Luis Obispo County coast. Nine of the 20 murrelets radiomarked in the post-breeding season dispersed long distances, 8 of which were relocated along the San Luis Obispo County coast after traveling 192–288 km (119-179 mi). Their results indicate that the San Luis Obispo coast extending south to Point Sal in Santa Barbara County is an important wintering area for the species in central California (Peery et al. 2008).

A review of records in eBird (accessed January 10, 2022) shows observations along the coast from Arroyo de la Cruz in northern San Luis Obispo County to the Purisima Point area on Vandenberg Air Force Base. Areas with concentrations of Marbled Murrelet observations include Piedras Blancas, Arroyo Laguna, San Simeon Bay, offshore of San Simeon State Park, Cayucos, Morro Bay, San Luis Obispo Bay, and off the Santa Maria River mouth. These records show peaks of occurrence along this stretch of coast in mid-January, May-early June, and mid-August-early November.

Marbled Murrelets forage at sea by pursuit diving in relatively shallow waters, usually between 20 and 80 m (66 to 262 ft) in depth with the majority of birds found as singles or pairs in a band 300–2,000 m (984-6562 ft) from shore (Strachan et al. 1995). After the breeding season, some birds disperse and are less concentrated in nearshore coastal waters, as is the case with some other alcids. Ainley et al. (1995) conducted ship-based surveys off central California and detected most Marbled Murrelets within 7 km of shore with the largest number occurring 3–5 km (1.9-3.1 mi) offshore. They observed one individual 24 km (15 mi) offshore near the edge of the continental shelf break.

California Least Tern. The California Least Tern (*Sterna antillarum browni*) was listed as endangered on October 13, 1970 (35 FR 16047). The recovery plan for the species was published in 1980 (USFWS 1980b) and a revised recovery plan was later published in 1985 (USFWS 1985). Critical habitat has not been designated. The primary reasons for listing this species were loss of habitat, human disturbance, and predation. On October 2, 2006, the USFWS announced the completion of a 5-year review of the status of the California Least Tern, wherein they recommended it for downlisting from endangered to threatened (USFWS 2006a). However, a proposed rule to downlist the species has not been published to date so the status of the taxa remains endangered throughout its range.

The California Least Tern is a summer visitor to California that breeds on sandy beaches close to estuaries and embayments discontinuously along the California coast from San Francisco Bay south to San Diego County and south into Baja California. The earliest spring migrants arrive in the San Diego area after the first week in April and reach the greater San Francisco Bay area by late April (Small 1994). Nesting colonies are usually located on open expanses of sand, dirt, or dried mud, typically in areas with sparse or no vegetation. Colonies are also usually in close proximity to a lagoon or estuary where they obtain most of the small fish they consume, although they may also forage up to 3–5 km (2–3 mi) offshore. In project vicinity, California Least Terns breed along the coast of San Luis Obispo County at Oceano Dunes and Guadalupe-Nipomo Dunes; there are very few local records of this taxa north of Pismo Beach (eBird Jan 10, 2022). Fall migration begins the last week of July and first week of August (USFWS 2006a) when the subspecies departs for its wintering grounds in Central and South America. Most individuals are gone from southern California by mid-September.

Studies conducted at some of the larger colonies in southern California show that at least 75 percent of all foraging activity during breeding occurs in the ocean (Atwood and Minsky 1983). Approximately 90–95 percent of ocean feeding occurred within 1 mile of shore in water depths of 60 feet or less. California Least Terns were rarely seen foraging at distances between 1–2 miles from shore and were never encountered farther than 2 miles offshore (Atwood and Minsky 1983). However, there is evidence of some migration off California that occurs as far as 20 miles offshore or more based on observations off southern California (Pereksta, pers obs.). Further evidence offshore Mexico possibly corroborates these observations (Howell and Engel 1993; Ryan and Kluza 1999).

Scripps's Murrelet. The Scripps's Murrelet (*Synthliboramphus scrippsi*) was listed as threatened under CESA on December 22, 2004. At the time of listing, the Scripps's Murrelet was known as Xantus's Murrelet and considered conspecific with the Guadalupe Murrelet (now *Synthliboramphus hypoleucus*); therefore, most of the existing literature on Scripps's Murrelet is associated with its former name (HT Harvey & Associates 2020). The breeding range of this small black and white alcid is restricted to 12 nesting islands or groups of islands over a distance of 500 miles in southern California and Baja Mexico (Pacific Seabird Group 2002). The estimated remaining global population of 5,000–20,000 birds is concentrated during the breeding season near the breeding colonies on the Channel Islands and off the coast of northern Baja California. The species typically nests in crevices, caves, under large rocks, on steep cliffs and canyons of offshore islands. The species disperses from breeding areas in late summer and autumn, when they move primarily northward (Whitworth et al. 2000). At this time of year, they are found from southern Baja California to Vancouver Island, British Columbia, with the bulk between central Oregon and central Baja California. The highest numbers of the Scripps's Murrelet have been reported from Point Conception to Monterey Bay and Point Año Nuevo, typically 20–100 km (12–62 mi) offshore, although it is occasionally seen from shore (Briggs et al. 1987). Scripps's Murrelet is considered casual to rare in the offshore portions of the Proposed Action area. Central California records have occurred from the continental shelf, shelf break, and beyond the shelf break; typically, during the

summer to mid-fall postbreeding dispersal period. The Scripps's Murrelet may occur in the offshore portions of the Proposed Action area but based on the species' known distribution it should only rarely occur during the postbreeding dispersal period, with a higher probability of potential occurrences during warm water years (e.g., El Niño years).

Guadalupe Murrelet. The Guadalupe Murrelet was listed as threatened under CESA on December 22, 2004. The Guadalupe Murrelet was known as Xantus's Murrelet at the time of listing and regarded as conspecific with the Scripps's Murrelet. Of the three species in this genus, the Guadalupe Murrelet is the rarest and most geographically restricted, breeding only on Guadalupe and San Benito Islands off Baja California. Postbreeding dispersal north occurs primarily to waters off southern California, but birds rarely occur north to the pelagic zone off central California, especially during warm water events. There are four records from the project area vicinity in eBird with three of those from the Davidson Seamount (eBird Jan 11, 2022).

3.6.2 Impacts of the Proposed Action

BOEM has conducted several NEPA reviews for geophysical and geological surveys and offshore wind site assessment activities offshore the Atlantic coast that evaluate impacts to birds that could occur as a result of those activities. This analysis incorporates some of the elements of those analyses while building upon them with specifics for the Morro Bay WEA. The impacts to bird species considered in this EA would be similar to those considered in these recent reviews due to the similarity of impact-causing factors and of bird species composition. This section discusses the potential impacts of routine events associated with the preferred alternative on marine and coastal birds. IPFs for marine and coastal birds include (1) active acoustic sound sources, (2) vessel and equipment noise and vessel traffic, (3) aircraft traffic and noise, (4) metocean buoys, (5) trash and debris, and (6) accidental fuel spills.

3.6.2.1 Active Acoustic Sound Sources

The primary potential for impact to marine and coastal birds from active acoustic sound sources is to marine birds and waterfowl that dive below the water surface and are exposed to underwater noise (Turnpenny and Nedwell 1994) including the Marbled Murrelet as well as other alcids, loons, cormorants, storm-petrels, shearwaters, petrels, grebes, and sea ducks. Among the threatened and endangered species, Western Snowy Plovers are shorebirds that are unlikely to come into contact with HRG surveys. Marbled, Scripps's, and Guadalupe Murrelets are more likely to come into contact with HRG surveys, as they forage offshore and feed by diving. The Short-tailed Albatross and Hawaiian Petrel may occur in the area but generally feed by snatching prey from the sea surface. Only those species that dive are at risk of exposure to active acoustic sound sources since pulses are directed downward and are highly attenuated near the surface. In addition, active acoustic sound sources such as side-scan sonar and sub-bottom profilers are highly directive (e.g., downward, towards the seafloor), with beam widths as narrow as a few degrees; this directivity and narrow beam width also diminishes the risk to bird species other than diving species. Because of these factors, other species of seabirds, waterfowl, and shorebirds would not be affected by active acoustic sound sources and are not discussed further for this IPF.

Birds have a relatively restricted hearing range for airborne noise, from a few hundred hertz to about 10 kHz (Dooling, 2000). Data regarding bird hearing range for underwater noise is limited; however, a recent study using psychophysics found that Great Cormorants (*Phalacrocorax carbo*) learned to detect the presence or absence of a tone while submerged (Hansen, 2017). The greatest sensitivity was found at 2 kHz, with an underwater hearing threshold of 71 dB re 1 μ Pa RMS. The hearing thresholds are

comparable to seals and toothed whales in the frequency band 1–4 kHz, which suggests that cormorants and other aquatic birds make special adaptations for underwater hearing and make use of underwater acoustic cues (Hansen, 2017).

Active acoustic sound sources usually have one or two (sometimes three) main operating frequencies. The frequency ranges for representative sources are 100 and 400 kHz for the side-scan sonar; 3.5, 12, and 200 kHz for the chirp sub-bottom profiler; and 240 kHz for the multibeam depth sounder. The low-frequency underwater noise generated by several types of survey equipment (e.g., sub-bottom profilers) would fall within the airborne hearing range of birds, whereas noise generated by other types of survey equipment (e.g., side-scan sonar, depth sounders) is outside of their airborne hearing range, which may be more limited underwater, and should be inaudible to birds.

Some marine birds and waterfowl, including gulls, terns, pelicans, and sea ducks, either rest on the water surface or shallow-dive for only short durations. Most of these birds would be resting on the water surface in the area surrounding survey vessels or would be dispersed; therefore, they would not come into contact with the active acoustic sounds. However, those birds that shallow-dive could come into contact with active acoustic sounds, with the majority of the sound energy directed towards the seafloor. Therefore, the energy level that these diving birds could be exposed to would be for such a short time and have a lower sound energy that it would result in a negligible impact.

Diving marine birds and waterfowl such as alcids, loons, cormorants, storm-petrels, shearwaters, petrels, grebes, and sea ducks could be susceptible to active acoustic sounds generated from survey equipment, especially those species that would likely dive, rather than fly away from a vessel (e.g., grebes, loons, alcids, and some diving ducks). However, seismic pulses are directed downward and highly attenuated near the surface; therefore, there is only limited potential for direct impact from the low-frequency noise associated with active acoustic sound sources to affect diving birds. In addition, active acoustic sound sources such as side-scan sonar and sub-bottom profilers are highly directive, with beam widths as narrow as a few degrees or narrower; the ramifications of this directionality include a lower risk of high-level exposure to diving birds that may forage close to (but lateral to) a survey vessel.

Investigations into the effects of acoustic sound sources on seabirds are extremely limited, however studies performed by (Stemp 1985) and (Lacroix et al. 2003) did not observe any mortality to the several species of seabirds studied when exposed to seismic survey noise; further, they did not observe any differences in distribution or abundance of those same species as a result of seismic survey activity. Based on the directionality of the sound and the low frequency equipment used for HRG surveys, it is expected that there would be no mortality or life-threatening injury and little disruption of behavioral patterns or other non-injurious effects of any diving marine birds or waterfowl from this direct impact, resulting in a negligible impact.

3.6.2.1.1 Vessel and Equipment Noise and Vessel Traffic

The primary potential impacts to marine and coastal birds from vessel traffic and noise are from underwater vessel and equipment noise, attraction to vessels and subsequent collision or entanglement, disturbance to nesting or roosting, and disturbance to feeding or modified prey abundance (Schwemmer et al. 2011). Since all survey activities are performed from vessels, with the exception of those conducted via aircraft, most survey activities have the potential to impact marine and coastal birds from vessel traffic and the associated vessel and equipment noise.

3.6.2.1.2 Underwater Noise

The sound generated from individual vessels can contribute to overall ambient noise levels in the marine environment on variable spatial scales. As stated above, birds have a relatively restricted hearing range, from a few hundred hertz to about 10 kHz (Dooling et al. 2000) for airborne noise, with few data available regarding bird hearing range for underwater noise. The survey vessels would contribute to the overall noise environment by transmitting noise through both air and water. Underwater noise produced by vessels is a combination of narrow-band (tonal) and broadband sound. Tones typically dominate up to about 50 Hz, whereas broadband sounds may extend to 100 kHz. According to (Southall 2005) and (Richardson, 2013 #1043), vessel noise typically falls within the range of 100–200 Hz. Noise levels dissipate quickly with distance from the vessel. The underwater noise generated from the survey vessels would dissipate prior to reaching the coastline and the shore/beach habitats of shorebirds, including the threatened Western Snowy Plover. Because of the dissipation of underwater noise from survey vessels prior to reaching the shore/beach habitat, it is expected that underwater noise would produce negligible impacts to shorebird species, including the Western Snowy Plover.

Some marine birds, including gulls, terns, pelicans, albatrosses, shearwaters, and petrels, as well as the endangered California Least Tern, Short-tailed Albatross and Hawaiian Petrel, either rest on the water surface, skim the water surface, or shallow-dive for only short durations. Because of these behaviors, members of these families would not come in contact with underwater vessel and equipment noise generated from HRG survey vessels, or the contact would be for such a short time that it would result in little disruption of behavioral patterns or other non-injurious effects. Therefore, impacts to these marine birds (including the California Least Tern, Short-tailed Albatross and Hawaiian Petrel) from vessel and equipment noise would be negligible.

Diving marine birds and waterfowl including the Marbled, Scripps's, and Guadalupe Murrelets as well as alcids, loons, grebes, cormorants, storm-petrels, shearwaters, petrels, and sea ducks could be susceptible to underwater noise generated from HRG survey vessels and equipment. Site assessment-related surveys typically use a single vessel. This level of vessel activity per survey event is not a significant increase in the existing vessel and equipment noise, the vessels are typically moving at slow speeds, and noise levels dissipate quickly with distance from the vessel. Machinery noise can be continuous or transient, and variable in intensity. Because of this noise dissipation, only a very small area would experience vessel and equipment noise and potential associated disruption. Therefore, impacts of underwater noise from survey vessels to the Marbled, Scripps's, and Guadalupe Murrelets and other diving marine birds and waterfowl are expected to be negligible.

3.6.2.1.3 Vessel Attraction

A single vessel is typically involved in a site assessment-related survey. This level of vessel traffic is not a significant increase when compared to existing vessel traffic in nearshore or offshore waters. In addition, vessels performing surveys are relatively slow moving (approximately 7.4–11.1 km/hr (4–6 kn)), which allows for marine and coastal birds to easily move out of the way of survey vessels.

The potential for bird strikes on a vessel is not expected to be significant to individual birds or their populations. However, a number of marine bird species, including members of the gulls, terns, albatrosses, storm-petrels, shearwaters, petrels, pelicans, and alcids are generally attracted to offshore rigs and vessels. The attraction of some of these bird species is due to light attraction at night (Black 2005; Montevecchi 2006; Montevecchi et al. 1999; Wiese et al. 2001b). However, some birds engage in ship following as a foraging strategy, especially with commercial or recreational fishing vessels. In

addition, in an open environment like the ocean objects are easy to detect and birds locate vessels easily from long distances and approach to investigate. Bird mortality has been documented as a result of light-induced attraction and subsequent collision with vessels. Birds exhibiting this behavior are typically alcids and petrels, with bird strikes typically occurring at night and occasionally resulting in mortality (Black 2005). In addition, alcids may also dive to escape disturbance, increasing their potential for collision with a vessel or gear in the water. Vessels are also required to have down-shielded lighting to minimize the potential attraction of birds. However, even if Marbled, Scripps's, and Guadalupe Murrelets or other birds were attracted to the survey vessels or dove near a survey vessel, there is a very low potential for either vessel collision or entanglement since the vessels are moving relatively slowly (7.4–11.1 km/hr (4–6 kn)) and the gear is towed from 1 to 3.5 m (3.3 to 11.5 ft) below the surface. There is no empirical evidence indicating that these types of marine and coastal birds could become entangled in HRG survey gear in spite of the potential for attraction to this gear. Given the low potential for collision or gear entanglement, the impacts are not expected to result in mortality or serious injury to individual birds, resulting in a negligible impact to these types of seabirds from vessel attraction.

Shorebirds including the Western Snowy Plover that reside along the shorelines are not known to be attracted to vessels. Therefore, there would not be impacts to shorebirds from vessel attraction. The Short-tailed Albatross and Hawaiian Petrel are members of Family *Procellariidae*, which are highly pelagic, and could be attracted to survey vessels offshore. However, as discussed above for other pelagic bird families, there is a low potential of impact from vessel collision or gear entanglement; therefore, the impacts are expected to be negligible to individual birds and their populations, as the Short-tailed Albatross and Hawaiian Petrel are rarely present in the vicinity of the Morro Bay WEA.

3.6.2.1.4 Disturbance to Nesting or Roosting

There is the potential for impact to marine and coastal birds from the potential disturbance of breeding colonies by airborne noise from vessels and equipment (Turnpenny and Nedwell 1994). Most marine and coastal bird species nest and roost along the shore and on coastal islands. Survey vessels for renewable energy projects are expected to make daily round trips to their shore base in Morro Bay.

Vessels could cause a disturbance to breeding birds, with the potential to adversely affect egg and nestling mortality, if a vessel approached too close to a breeding colony. Surveys would not occur close enough to land to affect marine and coastal bird breeding colonies during survey activities. However, survey vessels are anticipated to transit from a shore base to offshore and return daily. The expectation is that this daily vessel transit would occur at one of the shore bases identified or at other established ports, which have established transiting routes for ingress and egress in the coastal areas and existing vessel traffic. Because of this existing vessel traffic, it is not anticipated that marine and coastal birds would roost in adjacent areas, or if they did already roost nearby, the addition of survey vessels would not significantly increase the existing vessel traffic. In addition, noise generated from the survey vessels and equipment would typically dissipate prior to reaching the coastline and the nesting habitats of coastal birds. Impacts of airborne vessel and equipment noise to nesting or roosting marine and coastal birds would be negligible.

The Western Snowy Plover and California Least Tern are ground nesters along the shoreline. As discussed above, these taxa are not expected to nest in areas that would be disturbed by survey vessels transiting from port to offshore or coastal locations; therefore, there would be no impact to the nesting of these taxa. The Marbled Murrelet, Scripps's Murrelet, Guadalupe Murrelet, Short-tailed Albatross,

and Hawaiian Petrel do not breed anywhere near the project area; therefore, these species would not experience nesting impacts from survey activities.

3.6.2.1.5 Disturbance to Feeding or Modified Prey Abundance

Marine and coastal birds require specialized habitat requirements for feeding (Kushlan et al. 2002). Survey vessel and equipment noise could cause pelagic bird species, including gulls, terns, jaegers, alcids, pelicans, storm-petrels, albatrosses, shearwaters, and petrels, to be disturbed by the survey vessel and equipment noise and relocate to alternative areas, which could result in a localized, temporary displacement and disruption of feeding. These alternative areas may not provide food sources (prey) or habitat requirements similar to that of the original (preferred) habitat and could result in additional energetic requirements expended by the birds and diminished foraging opportunity. However, it is expected that if these species temporarily moved out of the area it would be limited to a very small portion of a bird's foraging range, and it would be unlikely that this temporary relocation would affect foraging success. Impacts to pelagic birds from disturbance associated with vessel and equipment noise would be negligible.

Morro Bay and the San Luis Obispo County coastline are extremely important for transient shorebirds during both northbound and southbound migrations. Possible indirect impacts to marine and coastal birds from vessel and equipment noise may include relocation of some prey species, which is primarily linked to seasonality. During their annual migrations, a number of marine and coastal birds have very specific stopover locations for species-specific foraging to accumulate fat reserves. Because of the noise produced from survey vessels, there is the potential for an indirect impact of modified prey abundance and distribution that migrating birds rely on for the accumulation of fat reserves to fuel their migration, which could result in additional energetic requirements for the migrating birds. However, it is unlikely that bird prey species would be affected by survey vessels to a level that would affect foraging success. As noted previously, surveys would not take place within coastal nearshore areas or within bays (e.g., Morro Bay). If prey species exhibit avoidance of the area in which a survey is performed, it is expected to be limited to a very small portion of a bird's foraging range and for a limited duration. Therefore, there is the potential for minor, temporary displacement of species from a portion of preferred feeding grounds during migration and minor, short-term displacement of marine and coastal bird species from non-critical activities during non-migration seasons resulting in minor impacts.

Western Snowy Plovers feed along the shoreline and would not be impacted by vessel and equipment noise. Marbled Murrelets and California Least Terns forage in nearshore waters, generally within 4 km (2.5 mi) of shore and could be temporarily displaced from preferred foraging areas by transiting vessels. Short-tailed Albatrosses and Hawaiian Petrels are only present while on long-distance foraging trips or during the non-breeding season and would experience temporary displacement. This would be limited to a very small portion of a bird's foraging range. It is unlikely that this temporary relocation resulting from survey vessel noise would affect foraging success of Short-tailed Albatrosses and Hawaiian Petrels.

3.6.2.1.6 Aircraft Traffic and Noise

Potential impacts to marine and coastal birds from aircraft traffic include noise disturbance and collision. Noises generated by project-related survey aircraft that are directly relevant to birds include airborne sounds from passing aircraft for both individual birds on the sea surface and birds in flight above the sea surface. Both helicopters and fixed-wing aircraft generate noise from their engines, airframe, and propellers. The dominant tones for both types of aircraft are generally below 500 Hz (Richardson 1995) and are within the airborne auditory range of birds. Aircraft noise entering the water

depends on aircraft altitude, the aspect (direction and angle) of the aircraft relative to the receiver, and sea surface conditions. The level and frequency of sounds propagating through the water column are affected by water depth and seafloor type (Richardson 2013). Because of the expected airspeed (250 km/hr [135 kn]), noise generated by survey aircraft is expected to be brief in duration, and birds may return to relaxed behavior within 5 minutes of the overflight (Komenda-Zehnder et al. 2003); however, birds can be disturbed up to 1 km (0.6 mi) away from an aircraft (Efroymsen et al. 2000).

The physical presence of low-flying aircraft can disturb marine and coastal birds, including those on the sea surface as well as in flight. Behavioral responses to flying aircraft include flushing the sea surface into flight or rapid changes in flight speed or direction. These behavioral responses can cause collision with the survey aircraft. However, (Efroymsen et al. 2000) reported that the potential for bird collision decreases for aircrafts flying at speed greater than 150 km/h.

Considering the relatively low numbers of aerial surveys, along with the short duration of potential exposure to aircraft-related noise, physical disturbance, and potential collision to marine and coastal birds, it is expected that potential impacts from this activity would range from negligible to minor.

3.6.2.1.7 Metocean Buoys

Potential impacts to marine and coastal birds from metocean buoys include noise disturbance/lighting, collisions, loss of habitat, and decommissioning. Noise and other disturbance generated by the installation or decommissioning of metocean buoys are expected to be short-term and localized, resulting in negligible impacts to birds. Because buoy height is anticipated to be up to approximately 12 m (40 ft) above the ocean surface, collisions with buoys are unlikely. Although seabirds, including terns, gulls, and cormorants may roost on buoys, roosting on buoys does not pose a threat to these birds. Thus, overall impacts to birds from metocean buoys are expected to be negligible. Although it is possible that Peregrine Falcons could use a tower as a perch to opportunistically prey on seabirds, this predation would be expected to have a negligible impact on birds overall.

Due to their excellent vision, birds flying during daytime hours are unlikely to collide with metocean buoys. However, night-flying or flying under other conditions that would impair their vision, birds could potentially collide with metocean buoys, leading to injury or death. Managing the type of lighting present on the buoys can minimize collisions.

Because the metocean buoys would be 34 km (21 mi) or more from the shoreline, the chances of birds colliding with the buoys would be rare, resulting in minor impacts on marine and coastal bird populations. Because the metocean buoys would be removed after the site assessment activities are concluded or at the end of the lease, any impacts on birds from the buoys would be temporary and thus negligible.

3.6.2.1.8 Trash and Debris

Plastic is found in the surface waters of all of the world's oceans and poses a potential hazard to marine birds through entanglement or ingestion (Laist 1987). The ingestion of plastic by marine and coastal birds can cause obstruction of the gastrointestinal tract, which can result in mortality. Plastic ingestion can also include blockage of the intestines and ulceration of the stomach. In addition, plastic accumulation in seabirds has also been shown to be correlated with the body burden of polychlorinated biphenyls (PCBs), which can cause lowered steroid hormone levels and result in delayed ovulation and other reproductive problems (Pierce et al. 2004).

Site characterization activities may generate trash comprising paper, plastic, wood, glass, and metal. Most trash is associated with galley and offshore food service operations. However, over the last several years, companies operating offshore have developed and implemented trash and debris reduction and improved handling practices to reduce the amount of offshore trash that could potentially be lost into the marine environment. These trash management practices include substituting paper and ceramic cups and dishes for those made of styrofoam, recycling offshore trash, and transporting and storing supplies and materials in bulk containers when feasible and have resulted in a reduction of accidental loss of trash and debris. In addition, all authorizations for shipboard surveys would include guidance for marine debris awareness. The guidance would be similar to the Bureau of Safety and Environmental Enforcement’s Notice to Lessees (NTL) No. 2015-G03 (“Marine Trash and Debris Awareness and Elimination”) or any NTL that supersedes this NTL. Therefore, the amount of trash and debris dumped offshore would be expected to be minimal, as only accidental loss of trash and debris is anticipated, some of which could float on the water surface. Therefore, impacts from trash and debris on marine and coastal birds, as generated by site characterization vessels or sampling and other site characterization related activities, would be negligible.

3.6.2.1.9 Impacts of Accidental Fuel Spills

An accidental event could result in release of fuel or diesel by a survey vessel. Spills occurring at the ocean surface would disperse and weather. Volatile components of the fuel would evaporate. Fuel and diesel used for operation of survey vessels is light and would float on the water surface. There is the potential for a small proportion of the heavier fuel components to adhere to particulate matter (PM) in the upper portion of the water column and sink. This accidental spill could occur either offshore or nearshore, and the marine and coastal bird species affected, and the type of effect, would differ depending on the location of the spill (Castege et al. 2007; Wiese et al. 2001a). If the accident occurred in nearshore waters, shorebirds including Western Snowy Plovers; Marbled Murrelets; California Least Terns, waterfowl; and coastal seabirds such as gulls, terns, loons, pelicans, cormorants, and grebes, could be impacted either directly or indirectly. Direct impacts would include physical oiling of individuals. The effects of oil spills on coastal and marine birds include the potential of tissue and organ damage from oil ingested during feeding and grooming from inhaled oil, and stress that could result in interference with food detection, predator avoidance, homing of migratory species, and respiration issues.

Indirect effects could include oiling of nesting and foraging habitats and displacement to secondary locations. The potential of a vessel collision occurring is quite low, with the potential for a resultant spill even lower. An accidental event could result in release of fuel or diesel by a survey vessel, but such an event has a remote probability of occurring. Therefore, an accidental fuel spill within nearshore waters would not be expected to result in significant impacts to these types of coastal and marine birds. Impacts to birds from accidents are unlikely; however, if they occur, there could be possible impacts on their food supply. However, impacts to shorebirds, waterfowl, and marine bird species would range from negligible to minor depending on timing and location. Since the populations of the Western Snowy Plover, Marbled Murrelet, and California Least Tern are already in peril, if an accidental fuel spill occurred that affected any of these species or their food supply, there would be a moderate impact to these species since birds are very susceptible to oiling impacts.

If the accidental event occurred in offshore waters, fuel and diesel would float on the water surface. There is potential for oceanic and pelagic seabirds such as alcid, storm-petrels, albatrosses, shearwaters, and petrels to be directly and indirectly affected by spilled diesel fuel. Impacts would include oiling of plumage and ingestion (resulting from preening). Indirect impacts could include oiling of

foraging habitats and displacement to secondary locations. The potential of a vessel collision occurring is quite low, with the potential for a resultant spill even lower. Dispersal, weathering, and evaporation would reduce the amount of fuel remaining on the sea surface. Impacts to oceanic and pelagic birds from a spill incident involving survey vessels within offshore waters would range from negligible to minor. However, since populations of Short-tailed Albatross and Hawaiian Petrel are already imperiled, if an accidental fuel spill occurred that affected them, there would be a moderate impact to that species since birds are very susceptible to oiling impacts.

Measures to Minimize Potential Adverse Impacts to Birds

To minimize the potential for adverse impacts on birds, BOEM has developed measures to reduce or eliminate the potential risks to or conflicts with specific environmental resources. If leases or grants are issued, BOEM may require the lessee to comply with these measures, as deemed appropriate at the time of review, through lease stipulations and/or as conditions of SAP approval. The following measures are intended to ensure that the potential for adverse impacts on birds is minimized, if not eliminated.

1. The lessee will use only red flashing strobe-like lights for aviation obstruction lights and must ensure that these aviation obstruction lights emit infrared energy within 675–900 nanometers wavelength to be compatible with Department of Defense night vision goggle equipment.
2. Any lights used to aid marine navigation by the Lessee during construction, operations and decommissioning of a meteorological tower or buoys must meet USCG requirements for private aids to navigation (https://www.uscg.mil/forms/cg/CG_2554.pdf).
3. For any additional lighting not described in (1) or (2) above, the lessee must use such lighting only when necessary, and the lighting must be hooded downward and directed when possible, to reduce upward illumination and illumination of adjacent waters.
4. An annual report shall be provided to BOEM documenting any dead birds found on vessels and structures during construction, operations, and decommissioning. The report must contain the following information: the name of species, date found, location, a picture to confirm species identity (if possible), and any other relevant information. Carcasses with federal or research bands must be reported to the U.S. Geological Survey's Bird Band Laboratory, available at <https://www.pwrc.usgs.gov/bbl/>.
5. Anti-perching devices must be installed on the metocean buoys in order to minimize the attraction of birds.

Conclusion

Overall, impacts to birds would be negligible. The construction, presence, and decommissioning of metocean buoys would pose minimal threats to birds. Loss of water column habitat, benthic habitat, and associated prey abundance are expected to have negligible impacts because of the small area affected by buoys. Impacts to birds in coastal waters from vessel traffic are expected to be negligible due to the amount of existing vessel traffic. Impacts on birds from site characterization surveys are expected to be negligible. Impacts to birds from trash or debris releases and from accidental fuel spills would be moderate for species that have special status designations and are susceptible to spills, but since it is an accidental impact and unlikely to happen, the impact to birds in general are expected to be negligible. Potential noise impacts from metocean buoy deployment could have localized, short-term minor impacts on birds foraging near or migrating through the construction site, and noise impacts from decommissioning are expected to be negligible. The risk of collision with the metocean buoy would be

negligible because of the buoy's height and its distance from shore. Additionally, the Proposed Action includes SOCs for birds to reduce the potential for the Proposed Action to adversely impact birds.

3.6.3 Bats

3.6.3.1 Impacts of the Proposed Action

While bats are expected to be rare in the Morro Bay WEA, bats could have avoidance or attraction responses to vessels and buoys due to noise, lighting, and the possible presence of insects. Bats have been recorded as using offshore ships as opportunistic stopover sites (Pelletier et al. 2013); thus, while it is undocumented, it is possible that vessels could unintentionally transport bats into the offshore environment.

The bat species that could occur offshore over federal waters are the hoary bat (*Lasiurus cinereus*) and western red bat (*Lasiurus blossevillii*) (HT Harvey and Associates 2020). Hoary bats are known to migrate south in autumn offshore and along the coast of central California, and western red bats are also known to migrate offshore of central California (Cryan and Brown 2007). Some species of bats hunt for insects in offshore areas where they normally migrate across open ocean areas, such as the Baltic Sea, and have been found to forage for flying insects around, and rest on, offshore wind turbines (Ahlén et al. 2007). No other species of bats are expected to occur in the marine portion of the Proposed Action area based on the lack of museum records and literature.

3.6.3.1.1 Site Characterization Activities

Impacts to bats from site characterization activities would be limited to avoidance or attraction responses to the vessels (or aircraft) conducting surveys. Lights and noise from vessels associated with site characterization activities could potentially disturb migrating or feeding bats and affect a bat's ability to forage, navigate, and communicate easily (Schaub et al. 2008). However, site characterization activities would not be concentrated and the noise and light from vessels are not likely to be intense. Few bats are expected to migrate or forage in the WEA, and activity, if any, is most likely to occur during a short period during migration in the late summer/early fall. Therefore, any impacts on bats from site characterization activities would be negligible.

3.6.3.1.2 Site Assessment Activities

Lights and noise from the vessels associated with construction, operation, and decommissioning of the metocean buoy(s) could affect a bat's ability to forage, navigate, and communicate easily and influence the behavior of migrating or feeding bats (Schaub et al. 2008; Stone et al. 2009).

No studies of the effects of intense light have focused on the bat species that may be found in the WEA. From light tolerance studies, *Myotis* species appear to be the species most intolerant of intensely lighted areas (Lacoueilhe et al. 2014; Stone et al. 2009) and most likely to have foraging and migratory behavior affected. Few *Myotis*, if any, are expected to occur in the WEA.

Red aviation lighting does not attract invertebrate prey (Bennett and Hale 2014). A study of the effects on bats from red aviation lighting on wind turbines found that hoary bats are neither attracted nor repelled from such lighting, and the eastern red bat is not attracted to aviation lights (Bennett and Hale 2014). No evidence suggests that the hoary bat or western red bat is repelled by light.

Some species of bats, particularly passive listening bats such as *Myotis*, can be repelled from areas with constant broadband noise (Schaub et al. 2008). Species using passive listening (using prey generated sound to detect prey) continue to emit echolocation calls while approaching prey (Russo et al. 2007), which suggests that, although foraging success in *Myotis* species could be affected by noise, there is no reason that navigation and communication will be affected. A study by (Bunkley and Barber 2015) concluded that *Myotis* species were not affected by compressor noise, which is broadband in nature and may be assumed to be similar to generator noise. Acoustic deterrent research has inferred through collision mortality comparisons that broadband ultrasonic broadcasts can reduce bat activity, with silver-haired bats and hoary bats avoiding areas with such broadcasts (Arnett et al. 2013). Broadband ultrasonic noise is dissimilar from any noise anticipated from vessels associated with construction, operation, and decommissioning of a metocean buoy.

Not all bat species are equally affected by either light or noise, or by the same types of light and noise, and data show some species of bat continuing to forage in both lighted and noisy suburban habitats, while foraging efficiency of other species has been adversely affected (Arnett et al. 2013; Bunkley and Barber 2015; Bunkley et al. 2015; Rydell 1991; Threlfall et al. 2012). No studies specifically address the effect of audible acoustic noise on the bat species expected to be found most often in the offshore environment—western red bat and hoary bat—so it is unknown if these species could be repelled or unaffected by noise. However, because bats do not depend on food or resting opportunities in the WEA, and because site assessment activities will be largely during daylight hours and of short duration, impacts to bats in the WEA are expected to be negligible.

The metocean buoy(s) could potentially provide a roosting opportunity not only for bats, but also birds that prey on bats such as gulls and Peregrine Falcons (Speakman, 1991). If bats were active during daylight and early dusk hours near the tower or buoys, there would be an opportunity for predation on bats while they forage or migrate offshore. Given the scarcity and distribution of both bats and predatory birds in the WEA, predation on bats is remote and unlikely, and impacts are expected to be negligible.

It is rare but possible that migrating bats may be driven into offshore OCS waters by a storm or high winds and subsequently into a buoy. Bat collisions with stationary structures, including meteorological towers, have been reported and are most likely to occur during stormy weather (Crawford and Wilson Baker 1981). However, the land-based roosting, breeding, and foraging behavior of bats, as well as their limited home ranges and echolocation sensory systems, suggest that there is little risk of a bat being blown that far out of its habitat range. In the unlikely event that a bat blown off course returns from the open ocean in the vicinity of the buoy in the WEA, the chances of the bat striking the tower or buoy are very small and would therefore be negligible.

The impacts from accidental fuel spills should not interfere with any aspect of bat behavior offshore, and impacts would therefore be negligible.

Conclusion

To the extent that there would be any impacts on individual bats, the overall impact on bats would be negligible. There is evidence to suggest that two species of migratory tree bats, none of which are state or federally listed, could migrate through the WEA in very low abundance, and mostly during the late summer and early fall. *Myotis* species could potentially occur in the WEA, although occurrence is anticipated to be rare. During periods of high boat activity, particularly nocturnal activities, there is a small chance that bats might avoid any areas associated with the Proposed Action. The metocean buoy

could serve as a roosting structure for bats and birds. The presence of a predatory bird at the tower or buoys could increase the possibility of predation if bird presence coincides with bat migration or foraging before darkness. The likelihood of collision between bats and boats or the buoy would be remote. Instances of bat collisions with towers are reported infrequently at terrestrial sites, and distribution and scarcity of bats in the offshore environment further reduce the potential for a collision with a comparatively small and isolated buoy offshore. The SOCs for birds, including lighting restrictions and installation of anti-perching devices, may also reduce potential impacts on bats.

3.6.4 No Action Alternative

Coastal and marine birds and bats in the geographic analysis area are subject to a variety of ongoing human-caused impacts that overlap with the Proposed Action, including fisheries bycatch in gill-net and other fisheries, oil spills, various contaminants, plastics pollution, anthropogenic noise, habitat destruction, introduced predators, disturbance of marine and coastal environments, and climate change. Many coastal and marine bird migrations cover long distances, and these factors can have impacts on individuals over broad geographical scales. Climate change has the potential to impact the distribution and abundance of coastal and marine bird prey due to changing water temperatures, ocean currents, and increased acidity.

Under this alternative, commercial leases and grants would not be issued in the Morro Bay WEA. However, BOEM expects ongoing activities and planned actions to have continuing regional impacts on coastal and marine birds over the timeframe considered in this EA. Impacts from urban development and increasing air, vessel, and onshore traffic will continue to contribute to climate change and will have negative impacts on coastal and marine birds. Implementation of the No Action Alternative would not meaningfully reduce ongoing impacts to coastal and marine birds from existing and potential future actions. The largest ongoing contributors to impacts on coastal and marine birds and bats stem from habitat destruction, disturbance of marine and coastal environments, and commercial and recreational fishing activities, primarily through bycatch.

3.7 COMMERCIAL FISHING

3.7.1 Affected Environment

The waters offshore California supports numerous types of fishing, and stakeholders place high cultural and economic significance on these activities. Lisa Wise Consulting (2008, 2015) and California Ocean Science Trust and California Department of Fish and Wildlife (CDFW, 2013) describe the characteristics of commercial fishing in the Morro Bay region and these citations are incorporated by reference for this assessment. During 2010–2019 the ex-vessel value of all marine commercial fisheries landings within California averaged approximately \$226 million per year (Table 3-9, CDFW 2021). Within this same period, the Morro Bay Port Complex (MBPC) contributed about 4 percent to this total and ranked last in ex-vessel landings value among the 9 port complexes defined by the SOC. Within the MBPC, commercial fishers primarily land their catch at two places, Morro Bay and Port San Luis, and use several smaller locations with less consistency. Sablefish and Dungeness crab dominate the value of landings at Morro Bay, and Dungeness crab and two species of nearshore rockfishes are most important at Port San Luis. Twenty-one other taxa recorded at least 1 percent of value landed at one or more of the local harbors. Gear and methods fishers use to ply the waters offshore California include trawl, pot/trap, net, harpoon, diving, longline, and other hook-and-line gear (jigs, bait, or trolling). The marine and coastal habitats and associated biotic assemblages that support regional fisheries are described in Section 3.48.

CDFW landing receipts (also known as “fish tickets”) provide spatially explicit information (Miller et al. 2017). Fishing effort and economic productivity reflect biological productivity and is highest in shallower waters near the coast, generally declining as depth increases (Miller et al. 2017). Within the WEA, bottom trawling for Pacific Coast groundfishes shows the greatest activity. Within the likely transit zone between ports and offshore areas, fishing activity occurs for most of the other targeted species.

Table 3-9: Ex-vessel Value (2021\$) of Landings for Some California Commercial Fisheries

Location/Fishery	Average Annual Ex-vessel Landings Value (2019\$) 2009-2018*	Statewide Value %	Regional EPC Value %	Local Harbor Value %	Depth (m) or Offshore Range (km) of Potential Fishing Grounds†	Call Area Overlaps with Potential Fishing Grounds?
California Statewide	216,128,424	100%	-	-	-	-
Eureka Port Complex (EPC)	38,907,766	18%	100%	-	-	-
Eureka Harbor	14,762,368	7%	38%	100%	-	-
Dungeness Crab	8,451,701	4%	22%	57%	Less than 230 m	No
Sablefish	1,870,730	< 1%	5%	13%	Less than 1,524 m	Yes
Dover Sole	1,289,162	< 1%	3%	9%	55 to 1463 m	Yes
Ocean (Pink) Shrimp	661,688	< 1%	2%	4%	73 to 229 m	No
Petrale Sole	547,548	< 1%	1%	4%	18 to 460 m	No
Thornyheads	494,852	< 1%	1%	3%	26 to 1,524+ m	Yes
Albacore Tuna	391,040	< 1%	1%	3%	EEZ and Int'l waters	Yes
Chinook Salmon	306,987	< 1%	< 1%	2%	0 to 46 km offshore	Yes
Night/Surf Smelt	201,904	< 1%	< 1%	1%	Primarily surf zone	No
<i>All other species</i>	546,756	< 1%	1%	4%	-	-
Trinidad Harbor	2,547,544	1%	7%	100%	-	-
Dungeness Crab	2,514,008	1%	6%	99%	Less than 230 m	No
<i>All other species</i>	33,536	< 1%	< 1%	1%	-	-
Crescent City Harbor	19,511,137	9%	50%	100%	-	-
Dungeness Crab	15,144,538	7%	39%	78%	Less than 230 m	No
Ocean (Pink) Shrimp	2,716,064	1%	7%	14%	73 to 229 m	No
Sablefish	410,664	< 1%	1%	2%	Less than 1,524 m	Yes
Coonstripe Shrimp	343,493	< 1%	< 1%	2%	Less than 185 m	No
Black Rockfish	216,766	< 1%	< 1%	1%	Less than 366 m	No
<i>All other species</i>	679,612	< 1%	2%	3%	-	-
All other locations	1,483,021	< 1%	4%	100%	-	-
Dungeness Crab	992,994	< 1%	3%	67%	Less than 183 m	No
Hagfishes	348,353	< 1%	< 1%	23%	9 to 732 m	Yes
Chinook Salmon	102,334	< 1%	< 1%	7%	0 to 46 km offshore	Yes
<i>All other species</i>	39,340	< 1%	< 1%	3%	-	-

† Depth data obtained from (1) Status of the Fisheries reports at <https://www.wildlife.ca.gov/Conservation/Marine/Status> for black tockfish, coonstripe shrimp, Dover sole, Dungeness crab, night smelt, ocean (pink) shrimp, Pacific hagfish, petrale sole, and surf smelt; and (2) Miller and Lea (1976), Guide to the Coastal Marine Fishes of California, Calif. Dept. Fish and Game, Fish Bull. No. 157, for black hagfish, Dover sole, longspine thornyhead, sablefish, and shortspine thornyhead. Albacore tuna offshore range obtained from Frawley et al. (2021). Chinook salmon offshore range obtained from Industrial Economics, Inc. 2012. Original data converted to metric units when necessary.

Miller et al. (2017) analyzed California Department of Fish and Wildlife (CDFW) landing receipts (also known as “fish tickets”) and demonstrated that fishing effort and economic productivity reflect biological productivity. Species that may be harvested within the WEA are part of fisheries that generally have extensive fishing grounds. Pacific groundfish that form at least 1% of a harbor’s landings value during 2009-2018 (Table 3-9) include sablefish, Dover sole, petrale sole, thornyheads, hagfishes, and black rockfish. Within federal waters, the spatial and depth distribution of fishing effort during 2002-2017 which targeted Pacific Coast groundfish is described by Sommers et al. (2020). Frawley et al. (2021) described the distribution of the West Coast albacore fishery between 1974 and 2016. Bellinger et al. (2015) provide some spatial information on the offshore extent of Chinook salmon fishing. Within the probable transit zone between ports and offshore areas, fishing activity occurs for many of the harvested species.

Vessel monitoring system (VMS) data describe the relative offshore distributions of commercial fishing activity for many important fisheries. BOEM funded the development of VMS data for the west coast and provisional VMS data of all vessels and selected fisheries are available on Databasin website (<https://caoffshorewind.databasin.org/datasets/2884e26d19c54691baa7589228ac985a/>). Within the WEA, bottom trawling for Pacific Coast groundfishes shows the greatest activity and within the likely transit zone between ports and offshore areas, fishing activity occurs for most of the other targeted species.

3.7.2 Impacts of the Proposed Action

Data collection buoys and vessel traffic associated with the Proposed Action may generate space-use conflicts and interfere with fishing operations by (1) creating areas no longer accessible as fishing grounds, (2) reducing fishing efficiency, and/or (3) causing economic losses associated with gear entanglement. Data collection buoys emplaced within leases may inadvertently be spatially incompatible with nearby fishing operations, particularly for bottom trawling, due to the challenge of navigating and deploying/retrieving fishing gear near fixed structures. Fishers may suffer decreased efficiency when trying to avoid buoys during their operations. If fishers fail to avoid buoys, subsequent entanglement may result in damage to or loss of fishing gear. If damage to a data collection buoy or its scientific instrumentation occurs because of fishing operations, the fishing vessel captain could be held financially responsible. The spatial extent of fishing grounds that may be impacted by buoys and traffic is estimated using, as an analog, USCG safety zone considerations for OCS facilities (33 CFR §147.1), where 500 m (1,640 ft) safety zones were established to promote the safety of life and property (e.g., 33 CFR §147.1109). This approach estimates a 0.785 km² (0.303 mi²) circular zone per buoy—a fraction of the total fishing grounds available for the Pacific Coast Groundfish Fishery (PFMC 2020), the Pacific Coast Salmon Fishery (PFMC 2016), and the West Coast albacore fishery (Frawley et al., 2021). Given that harvest strategies vary among individuals, some fishers may be disproportionately impacted by the Proposed Action compared to others.

Site characterization and assessment activities and Proposed Action marine vessels mobilizing and transiting from ports to the WEA may reduce efficiency of fishing operations due to time delays associated with congestion or avoidance. Marine vessels associated with the Proposed Action may accidentally damage fishing gear (e.g., by cutting trap floats) or release marine debris which could cause entanglement or interfere with other fishing operations. The MBPC and its nearshore waters host a variety of marine operations and numerous fishers, so the expected increase in activity from Proposed Action vessels will be small compared to the overall level of effort.

Many of the region's important fishing grounds are in depths less than 900 m (2,953 ft), so a buoy within the WEA (900 m and 1,300 m (2,953 ft and 4,265 ft) depth) decreases conflict with the fishing industry due to its offshore location. At the end of the 5-year term data collection instrumentation will be decommissioned, and large marine debris objects removed so any space use conflict will be eliminated. Vessel operators are required to comply with pollution regulations outlined in 33 CFR 151.51-77 so only accidental loss of trash and debris is anticipated. To enhance navigational safety, lessees will develop a SAP that will include site-specific measures to mitigate navigational concerns, which could become terms and conditions of SAP approval. Such measures may include a Local Notice to Mariners, vessel traffic corridors, lighting specifications, incident contingency plans, or other appropriate measures. Some of these navigational safety measures are also expected to reduce negative interactions between fishers and Project vessels.

Conclusion

The impact analysis for ascertaining space-use conflicts with commercial fishing considered marine shipping, marine protected areas, and the IPCs associated with the Proposed Action. Potential impacts to commercial fishing from the Proposed Action are expected to be minor and temporary in duration (5 years or less), and primarily associated with a spatial incompatibility around the data collection buoy(s) and interactions with Project vessels, which is comparatively small in size when compared to the full extent of available fishing grounds. BOEM directs lessees to incorporate Best Management Practices that will aim to minimize adverse effects to commercial fishing from their site assessment and site characterization activities.

3.7.3 No Action Alternative

Under this alternative, commercial leases and grants would not be issued in the Morro Bay WEA. However, BOEM expects ongoing activities and planned actions to have continuing regional impacts on commercial fishing over the timeframe considered in this EA. Impacts from urban development and increasing air, vessel, and onshore traffic will continue to contribute to climate change and will have negative impacts on commercial fishing. Implementation of the No Action Alternative would not meaningfully reduce ongoing impacts to commercial fishing from existing and potential future actions.

3.8 RECREATION AND TOURISM

3.8.1 Affected Environment

Marine-based tourism and recreation contribute significantly to San Luis Obispo and Ventura counties' economies. Tourism is San Luis Obispo county's largest industry and a notable contributor to Ventura County's economy. Both coastal land and ocean activities and attractions are utilized by locals and tourists. Shore based activities include visiting historic towns and landmarks, biking, bird watching, and beach going. Ocean activities include swimming, diving, surfing, kayaking, boating, sailing, and fishing. Recreational fisheries for highly migratory species, such as tuna and billfish, take place in waters deeper than 200 meters (656 ft).

3.8.1.1 Economic Importance of Ocean Recreation and Tourism

For California's San Luis Obispo County, the total ocean economy is a significant component of the county's total economy. The total ocean economy is a measure of all ocean economic activities within a geography. For San Luis Obispo County, the Total Ocean Economy in 2018 was 3.0 percent of the total

economy when measured by GDP, bringing in \$447.9 million, with an average of \$49,500 GDP per employee. Of the total ocean economy for San Luis Obispo County as measured by GDP, tourism and recreation made up 91.1 percent, or \$407.8 million, with an average of \$47,400 GDP per employee. Tourism and recreation are defined as eating and drinking establishments, hotels, marinas, campsites and RV parks, scenic water tours, boat dealers and charters, manufacture of sporting goods, amusement and recreation services, recreational fishing, zoos, and aquariums (NOAA, ENOW).

Employment based on the ocean economy made up 8 percent of the San Luis Obispo County's total economy in 2018. A total of 9,451 people were employed in the total ocean economy with 402 people being self-employed. Tourism and recreation accounted for 95.2 percent of the total ocean economy when measured by employment with 8,749 people employed, 138 being self-employed (NOAA, ENOW).

Business establishments based on the total ocean economy account for 5 percent of the county's total economy in 2018, centered around 569 establishments with an average number of 16 employees per establishment. Of that 5 percent, the total San Luis Obispo County economy when measured by establishments, 93.1 percent of that was focused on tourism and recreation. This amounted to 530 establishments with an average of 16 employees per establishment (NOAA, ENOW).

Wages based on the total ocean economy accounted for 3.8 percent of the county's total economy in 2018, with \$214.9 million in wages paid with an average of \$23,700 per employee. San Luis Obispo County's total ocean economy wages, tourism and recreation took 90.4 percent of the total. Wages totaled \$194.3 million, with an average of \$22,600 per employee (NOAA, ENOW).

For California's Ventura County, the total ocean economy is a significant component of the county's total economy. The total ocean economy is a measure of all ocean economic activities within a geography. For Ventura County, the Total Ocean Economy in 2018 was 2.6 percent of the total economy when measured by GDP, bringing in \$1.2 billion, with an average of \$69,000 GDP per employee. Of the total ocean economy for Ventura County as measured by GDP, tourism and recreation made up 56.5 percent, or \$677.5 million, with an average of \$44,600 GDP per employee (NOAA, ENOW).

Employment based on the ocean economy made up 5 percent of the Ventura County's total economy in 2018. A total of 17,367 people were employed in the total ocean economy with 560 people being self-employed. Tourism and recreation accounted for 87.4 percent of the total ocean economy when measured by employment with 15,182 people employed, 105 being self-employed (NOAA, ENOW).

Business establishments based on the total ocean economy account for 4 percent of the county's total economy in 2018, centered around 1,000 establishments with an average number of 17 employees per establishment. Of that 4 percent, the total Ventura County economy when measured by establishments, 84.8 percent of that was focused on tourism and recreation. This amounted to 848 establishments with an average of 18 employees per establishment (NOAA, ENOW).

Wages based on the total ocean economy accounted for 2.8 percent of the county's total economy in 2018, with \$498.7 million in wages paid with an average of \$28,700 per employee. Ventura County's total ocean economy wages, tourism and recreation represent 65.3 percent of the total. Wages totaled \$325.7 million, with an average of \$21,500 per employee (NOAA, ENOW).

3.8.2 Impacts of the Proposed Action

3.8.2.1 Routine Activities

Previous studies have shown that the main impact-producing factor associated with site characterization surveys would be the generation of trash and debris. Compliance with federal regulations and the relative amount of added vessel traffic compared to existing vessel traffic would reduce accidental generation of trash and debris to a minimum. Site assessment activities would add vessel traffic. However, the total vessel traffic associated with site characterization surveys and site assessment activities should remain small and, therefore, the activities proposed are not expected to have a measurable impact on tourism and recreation.

3.8.2.2 Non-Routine Events

Previous projects have studied the effect of accidental fuel spills on recreation and tourism. Diesel spills were expected to disperse rapidly and the impacts on recreation and tourism were expected to be negligible to minor, depending on the location of the spill.

Conclusion

Site assessment activities and site characterization surveys would not impact viewsheds. Based on this, the relatively small total vessel traffic associated with site characterization surveys and site assessment activities, and the negligible potential impacts from accidental fuel spills, the overall impacts to recreation and tourism are expected to be negligible.

3.8.3 No Action Alternative

Under this alternative, commercial leases and grants would not be issued in the Morro Bay WEA. However, BOEM expects ongoing activities and planned actions to have continuing regional impacts on tourism and recreational activity over the timeframe considered in this EA. Impacts from urban development and increasing air, vessel, and onshore traffic will continue to contribute to climate change and will have negative impacts on tourism and recreational activity. Implementation of the No Action Alternative would not meaningfully reduce ongoing impacts to tourism and recreational activity from existing and potential future actions.

3.9 SOCIOECONOMICS

3.9.1 Affected Environment

3.9.1.1 Population and Demographics

This section presents an overview of major socioeconomic characteristics and trends to provide a context from which to assess impacts of the proposed action. County selection is based on those with ports which may be used by a lessee. Demographic and economic characteristics and trends are presented at the county level. Ports that Lessees may use include Morro Bay, Avila Beach, and Port Hueneme due to the proximity of the proposed leases. Both Morro Bay and Avila Beach are within San Luis Obispo County. Port Hueneme is in Ventura County. Both San Luis Obispo County and Ventura County are likely to experience economic impacts associated with the development of offshore leases. Larger ports to the north and south which may be used include Long Beach/Port of Los Angeles and the Port of San Francisco.

San Luis Obispo County is located on California’s central coast. The county is bordered on the north by Monterey, on the east by Kern and to the south by Santa Barbara. San Luis Obispo has several tourist attractions and recreational areas, including Hearst Castle in San Simeon, visited by more than 70,000 people annually. Morro Bay is the only all-weather small craft commercial and recreational harbor between Santa Barbara and Monterey. Currently, there is an interest in developing an offshore commercial wind farm in this area.

Ventura County is located along the southern coast of California. Surrounding counties include Kern County to the north, Los Angeles County to the south and east, and Santa Barbara to the northwest. There are hundreds of miles of national and state parks and forests in Ventura County. The Los Padres National Forest makes up most of the northern half of the county; two major lakes, Lake Casitas and Lake Piru, also lie within Ventura's boundaries. Port Hueneme is the only deep-water port between Los Angeles, and San Francisco.

The Port of San Francisco is located approximately 200 miles to the north of the Morro Bay lease area. This port complex was the 10th largest port in the US in 2020. A substantial number of ocean economy based industries are located within the Port. The surrounding counties contain a large and diverse set of economic activities. Within the greater bay area, the population exceeds 7 million people in nine counties. Impacts from economic development of the Morro Bay leases would be insufficient to have a perceptible impact on local employment and population.

The Ports of Los Angeles and Long Beach located in Los Angeles County are approximately 200 miles to the south of the Morro Bay lease area. These two ports are the 1st and 3rd busiest ports in the US. A substantial number of ocean economy based industries are located within these ports. Located on the southern coast of the state, Los Angeles County covers over 4,000 square miles and includes San Clemente and Santa Catalina islands. Neighboring counties include Orange, Kern, San Bernardino, and Ventura. LA county alone has a population of more than 10 million. The surrounding counties also have large populations. Economic development of the Morro Bay leases would be insufficient to have a perceptible impact on local employment and population.

Population and labor force statistics for San Luis Obispo County, Ventura County, and the state of California are presented in Table 3-10. San Luis Obispo and Ventura counties have lower unemployment rates, have smaller populations, and lower per capita income when compared to statewide data.

Table 3-10: Population, Labor Force, and Employment Statistics

Area	Population	Labor Force	Employed	Unemployed	Unemployment Rate	Per Capita Income
San Luis Obispo County	277,276	133,700	128,800	4,900	3.6%	\$61,004
Ventura County	844,213	411,900	394,600	17,300	4.2%	\$64,715
California	39,761,195	19,178,900	18,138,400	1,040,500	5.4%	\$66,619
Data Year	2019	2021	2021	2021	2021	2019

Source: CAEDD, 2021

(<https://www.labormarketinfo.edd.ca.gov/cgi/databrowsing/localAreaProfileQSResults.asp?selectedarea=San+Luis+Obispo+County&selectedindex=40&menuChoice=localAreaPro&state=true&geogArea=060400079&countyName=>)

The National Ocean Economics Program publishes datasets on employment and establishments compiled from the Bureau of Labor Statistics on economic activity that typically takes place in the ocean

or is supports the activity. The industrial sectors for which the data are compiled include living resources, tourism and recreation, and transportation. Data classified as “other” contains information that is aggregated.

As of 2018, ocean-related jobs make up 8 percent of employment within San Luis Obispo County and 5 percent of employment in Ventura County, compared to 3 percent statewide (Table 3-11). In San Luis Obispo and Ventura Counties, over 95 percent and 87 percent of these jobs, respectively, are centered on the tourism and recreation sector, with living resources, transportation, and other jobs consisting of the remainder. On a relative basis, the ocean economy provides a relatively high number of jobs at the county level when compared to the total employment within California.

Table 3-11: Ocean Economy Employment

Area	% of Total Economy	Employment	Ocean Economy Subsectors			
			Living Resources	Tourism & Recreation	Transportation	Other
San Luis Obispo County	8.0%	9,451	1.1%	95.2%	1.0%	2.7%
Ventura County	5%	17,367	1.0%	87.4%	4.7%	6.9%
California	3.0%	602,454	1.5%	75.3%	19.3%	3.9%

Source: NOAA, 2018. (<https://coast.noaa.gov/enowexplorer/#/employment/total/2018/06079>)

As of 2018, ocean-related wages within San Luis Obispo and Ventura Counties make up 3.8 percent and 2.8 percent of the total economy, respectively, compared to 2.1 percent statewide (Table 3-12). On a relative basis the ocean economy provides a modestly higher portion of wages at the county level, when compared to the total coastal wages within California. However, wages per employee are significantly below the coastal statewide average in both counties.

Table 3-12: Ocean Economy Wages

Area	% of Total Economy	Wages (\$ millions)	Wages per Employee
San Luis Obispo County	3.8%	\$214.9	\$23,700
Ventura County	2.8%	\$499	\$28,700
California	2.1%	\$24,800	\$42,400

Source: NOAA, 2018. (<https://coast.noaa.gov/enowexplorer/#/employment/total/2018/06079>)

As of 2018, ocean-related Gross Domestic Product (GDP) is 3 percent of the total economy for San Luis Obispo County and 2.6 percent for Ventura County compared to 1.7 percent statewide (Table 3-13). On a relative basis, the ocean economy provides a slightly higher portion of GDP at the county level, when compared to the total coastal GDP within California. However, GDP per employee is significantly below and moderately below the coastal statewide average in San Luis Obispo County and Ventura County, respectively.

Table 3-13: Ocean Economy GDP

Area	% of Total Economy	GDP (\$ millions)	GDP per Employee
San Luis Obispo County	3.0%	\$447.9	\$49,500
Ventura County	2.6%	\$1,200	\$69,000
California	1.7%	\$49,100	\$83,800

Source: <https://coast.noaa.gov/enowexplorer/#/gdp/total/2018/06079>

3.9.2 Impacts of the Proposed Action

Temporary increases in employment from Proposed Action activities, such as surveying, tower and buoy fabrication, and construction would occur in various local economies associated with onshore – and offshore-related industries in the coastal counties of California. An analysis of similar projects on the east coast (G&G Final PEIS (BOEM, 2014a)) found that the small number of workers (approximately 10-20 people) directly employed in site characterization surveys, would be insufficient to have a perceptible impact on local employment and population.

BOEM expects any beneficial impacts to employment, population, and the local economies in and around San Luis Obispo and Ventura counties to be short-term and imperceptible. When taking into consideration the distribution of activities and the time frame over which they would occur, the impacts would be negligible. Although the approximate number of workers directly employed would be measurable, benefits to the local economy would be difficult to measure. The overall beneficial impacts to the local economy, and therefore to demographics and employment, would be negligible.

Conclusion

BOEM anticipates that the proposed action would have beneficial, short-term impacts to demographics and employment in San Luis Obispo and Ventura counties and adjacent areas, but impacts would be imperceptible and are expected to be negligible. Impacts to the Port of San Francisco and Los Angeles/Long Beach ports would be imperceptible and are also expected to be negligible.

3.9.3 No Action Alternative

Under this alternative, commercial leases and grants would not be issued in the Morro Bay WEA. However, BOEM expects ongoing activities and planned actions to have continuing regional impacts on economic activity over the timeframe considered in this EA. Impacts from urban development and increasing air, vessel, and onshore traffic will continue to contribute to climate change and will have negative impacts on the region's economy. Implementation of the No Action Alternative would not meaningfully reduce ongoing impacts to economic activities from existing and potential future actions.

3.10 HISTORIC PROPERTIES

Historic properties are defined as any pre-contact period or historic period district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) (54 USC § 300308). This can also include properties of traditional religious and cultural importance to a Tribe that meet criteria for inclusion in the NRHP (54 USC § 302706). Both site assessment activities (i.e., installation of meteorological buoys) and site characterization (i.e., HRG survey and geotechnical exploration) have the potential to affect historic properties. Construction activities associated with the placement of site assessment structures that disturb the ocean bottom have the potential to affect historic properties on or under the seabed. Vessel traffic associated with surveys and construction, although indistinguishable from existing ocean vessel traffic could, at times, be visible from coastal areas, potentially impacting historic properties onshore. Similarly, although indistinguishable from other lighted structures on the OCS, some meteorological buoys might be visible from historic properties onshore.

3.10.1 Affected Environment

Historic properties within or nearby the WEA include potential submerged pre-contact sites dating back at least 15,000 years and shipwrecks dating from at least the 16th through mid-20th centuries. Based on the current understanding of sea level rise and the earliest date of human occupation in the western hemisphere, any submerged pre-contact site on the Pacific OCS would be located shoreward of the 130 m (427 ft) bathymetric contour line (ICF 2013; Clark et al. 2014). Additionally, pre-contact period sites would most likely be found in the vicinity of paleochannels or river terraces that offer the highest potential of site preservation; however, preservation conditions are variable and depend on local geomorphological conditions and the speed of sea level rise. Water depths across the WEA range from approximately 860-1300 meters (2821-4265 ft), therefore, the potential for submerged pre-contact period sites is non-existent within the WEA. There is, however, the potential for submerged pre-contact sites to exist within a yet to be determined surveyed transmission cable corridor extending from the WEA toward shore.

According to the BOEM Pacific Shipwreck Database, there are no reported shipwreck losses within or near the Morro Bay WEA. The California State Lands Commission, which maintains a database of shipwreck losses within state waters, does not report any shipwreck losses within the Morro Bay WEA, however, 6 shipwrecks are reported to have been lost directly east of the WEA within state waters, all of which date to the mid-20th century. The most significant of these vessel losses is *SS Montebello*, an oil tanker that was torpedoed and sunk during World War II by a Japanese submarine. *Montebello* was en route to Vancouver, BC, carrying over 3 million gallons of crude oil when the vessel was lost on December 23, 1941. The vessel was listed on the National Register of Historic Places in 2016 and is located approximately 18 miles east of the Morro Bay WEA (NOAA 2021).

The information presented in this section is based on existing and available information and is not intended to be a complete inventory of historic properties within the affected environment. The WEA has not been extensively surveyed and that, in part, is the reason that BOEM requires the results of historic property identification surveys to be submitted with a SAP and COP. Additional background information on potential historic properties near the WEA and an overview of the types of cultural resources that might be expected on the Pacific OCS may be found in the BOEM-funded report Inventory and Analysis of Coastal and Submerged Archaeological Site Occurrence on the Pacific Outer Continental Shelf (ICF 2013).

3.10.2 Impacts of the Proposed Action

3.10.2.1 Site Characterization

As described in Section 2.1 above, site characterization activities include shallow hazards assessments, and geological, geotechnical, archaeological, and biological surveys, and may include installation, operation, and decommissioning of data collection buoys. HRG surveys do not impact the seafloor and therefore have no ability to impact cultural resources. Geotechnical testing and sediment sampling does impact the bottom and, therefore, does have the ability to impact cultural resources. However, if the Lessee conducts HRG surveys prior to conducting geotechnical/sediment sampling, the Lessee may avoid impacts on historic properties by relocating the sampling activities away from potential cultural resources. Therefore, BOEM would require the Lessee to conduct HRG surveys prior to conducting geotechnical/sediment sampling, and, when a potential historic property is identified, the Lessee will be required to avoid it. Inclusion of the following elements in the lease(s) will ensure avoidance of historic properties:

The Lessee may only conduct geotechnical exploration activities, including geotechnical sampling or other direct sampling or investigation techniques, in areas of the leasehold in which an analysis of the results of geophysical surveys have been completed for that area. The geophysical surveys must meet BOEM's minimum standards (see BOEM Archaeological Survey Guidelines), and the analysis must be completed by a qualified marine archaeologist who meets both the Secretary of the Interior's Professional Qualifications Standards (48 Federal Register (FR) 44738–44739) and has experience analyzing marine geophysical data. This analysis must include a determination whether any potential archaeological resources are present in the area and the geotechnical (sub-bottom) sampling activities must avoid potential archaeological resources by a minimum of 50 m (164 ft). The avoidance distance must be calculated from the maximum discernible extent of the archaeological resource. In no case may the Lessee's actions impact a potential archaeological resource without BOEM's prior approval.

Additionally, during all ground-disturbing activities, including geotechnical exploration, BOEM requires that the Lessee observe the unanticipated finds requirements stipulated in 30 CFR 585.802. If the Lessee, while conducting activities, discovers a potential archaeological resource while conducting construction activities or other activities, the Lessee must immediately halt all seafloor-disturbing activities within the area of discovery, notify BOEM within 72 hours of the discovery, and keep the location of the discovery confidential and not take any action that may adversely affect the resource until BOEM has made an evaluation and instructed the Lessee on how to proceed.

Finally, vessel traffic associated with survey activities, although indistinguishable from existing ocean vessel traffic, could at times be within the viewshed of onshore historic properties. These effects would be limited and temporary.

3.10.2.2 Site Assessment

As described above, site assessment activities consist of construction, operation, and decommissioning of up to three meteorological buoys. To assist BOEM in complying with the National Historic Preservation Act (NHPA) and other relevant laws (30 CFR 585.611(a), and (b)(6)), the SAP must contain a description of the archaeological resources that could be affected by the activities proposed in the plan. Under its Programmatic Agreement (PA) (Appendix C), BOEM will then consult to ensure potential effects to historic properties are avoided, minimized, or mitigated under Section 106 of the NHPA.

BOEM anticipates that bottom disturbance associated with the installation of meteorological buoys would disturb the seafloor in a maximum radius of 239 m (784 ft) around each buoy anchor location. This includes all anchorages and appurtenances of the support vessels. Impacts on archaeological resources within 239 m (784 ft) of each meteorological buoy would result from direct destruction or removal of archaeological resources from their primary context. Although this would be extremely unlikely given that site characterization surveys described above would be conducted prior to the installation of any structure (see e.g., 30 CFR 585.610-611), should contact between the activities associated with site assessment and a historic property occur, there may be damage or loss to archaeological resources.

Should the surveys reveal the possible presence of an archaeological resource in an area that may be affected by its planned activities, the applicant would have the option to demonstrate through additional investigations that an archaeological resource either does not exist or would not be adversely affected by the seafloor/bottom-disturbing activities (see 30 CFR 585.802(b) and the PA in Appendix C). Although site assessment activities have the potential to affect cultural resources either on or below the

seabed or on land, existing regulatory measures, coupled with the information generated for a Lessee's initial site characterization activities and presented in the Lessee's SAP, make the potential for bottom-disturbing activities (e.g., anchoring, installation of meteorological buoys) to cause damage to cultural resources very low.

Installation of meteorological buoys would likely not be visible from shore based on the low profile of the structure; distance from shore; and earth curvature, waves, and atmosphere. Visual impacts to onshore cultural resources would be limited and temporary in nature and would consist predominately of vessel traffic, which most likely also would not be distinguishable from existing vessel traffic. Therefore, the likelihood of impacts on onshore cultural resources from meteorological structures and from construction vessel traffic also would be very low.

Conclusion

Bottom-disturbing activities have the potential to affect historic properties. However, existing regulatory measures, information generated for a Lessee's initial site characterization activities, and the unanticipated discoveries requirement make the potential for bottom-disturbing activities (e.g., coring, anchoring, installation of meteorological buoys) to have an adverse effect (i.e., cause significant impact or damage) on historic properties, very low. Visual impacts on onshore cultural resources from meteorological structures, and vessel traffic associated with surveys and structure construction, are expected to be negligible and temporary in nature.

3.10.3 No Action Alternative

Under the No Action Alternative, no leases or grants would be issued in the Morro Bay WEA at this time, and therefore no lease-related site assessment and characterization impacts on offshore cultural, historical, or archaeological resources would occur. Although leases would not be issued under the No Action Alternative, BOEM expects ongoing activities (such as bottom trawling) and changing environmental conditions to have continuing impacts on historic resources.

3.11 ENVIRONMENTAL JUSTICE

Environmental justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

The effects of this Federal action on minority and low-income populations were analyzed in accordance with Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations (Federal Register, 1994); Executive Order 13166 – Improving Access to Services for Persons with Limited English Proficiency (Federal Register, 2000); the CEQ's Environmental Justice Guidance Under the National Environmental Policy Act (CEQ, 1997), and the EPA's Technical Guidance for Assessing Environmental Justice in Regulatory Analysis (U.S. EPA, 2016).

3.11.1 Affected Environment

This Federal action's potential area of impact on the human environment is San Luis Obispo County, California, which is the corresponding onshore area with respect to the Morro Bay WEA. Depending on wind velocity, parts of the coastline north of San Luis Obispo County may be downwind of the WEA;

however, that area in south Monterey County is part of the Silver Peak Wilderness, is sparsely populated, and has negligible potential for EJ impacts.

3.11.1.1 Demographics

Demographic analysis of San Luis Obispo County shows that there are no minority populations that exceed 50 percent of the total county population; and that the minority population percentage of the county is generally lower than the minority population percentage of California (Table 3-14).

Table 3-14: Demographic for SLO County and California

Category	San Luis Obispo County	California
Total population	282,424	39,237,836
White alone	88.8%	71.9%
Black or African American alone	2.0%	6.5%
American Indian and Alaska Native alone	1.4%	1.6%
Asian alone	4.0%	15.5%
Native Hawaiian and Other Pacific Islander alone	0.2%	0.5%
Hispanic or Latino	22.9%	39.4%
White alone, not Hispanic or Latino	68.5%	36.5%
Persons in poverty	10.6%	11.5%
Language other than English spoken at home age 5 years +	18.0%	44.2%

Source: U.S. Census Bureau, 2021.

Environmental justice issues most often occur on a localized, sub-county scale. Therefore, additional analyses were performed using the U.S. EPA’s EJSCREEN screening and mapping tool to focus on local demographics in communities adjacent to Morro Bay and Avila Beach (Table 3-15). Demographics were determined for 5-mile radii centered on Los Osos Middle School (located east of Morro Bay), Monte Young Park (north of Morro Bay), and Avila Beach Pier (located at Avila Beach) (Table 3-15). These locations were chosen because they are likely to experience the highest concentrations of air emissions from marine service vessels associated with WEA site characterization and site assessment activities. Again, there were no indications of minority or low-income neighborhoods that might be disproportionately adversely impacted.

California Men’s Colony, located northwest of San Luis Obispo, was identified as having a concentrated minority population. However, it is not considered to be a potential receptor that might be adversely impacted because it is located approximately 6 miles east of Morro Bay.

Table 3-15: Micro-demographics for Selected Areas

Category	Los Osos Middle School	Monte Young Park	Avila Beach Pier
Population	25,246	27,582	4,956
White	89%	91%	90%
Black	1%	0%	1%
American Indian	1%	1%	0%
Asian	3%	3%	2%
Pacific Islander	0%	0%	0%
Other	2%	2%	3%

Category	Los Osos Middle School	Monte Young Park	Avila Beach Pier
Total Hispanic Population	15%	14%	9%
Speak English Less Than “Very Well”	5%	5%	1%
Spanish Spoken at Home	14%	9%	5%
Household Income Base <\$25,000	17%	17%	11%
Household Income Base <\$50,000	47%	36%	28%

Source: U.S. EPA EJScreen

3.11.2 Impacts of the Proposed Action

This Federal action involves vessels for each lease conducting survey operations and deploying or servicing buoys. The IPFs with respect to environmental justice are primarily related to air and water pollutant releases. These releases are analyzed further in the Air Quality and Water Quality sections of this EA. The air emissions are derived primarily from internal combustion engines used for propulsion of marine vessels, and auxiliary engines used for powered equipment such as cranes and winches. These emissions are primarily nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), and PM. Greenhouse gases are also produced, primarily in the form of carbon dioxide (CO₂). Other sources are the emission of hydrocarbons from fuel and lubricants. Fuel and lubricants can be released during both normal operations and as a result of emergency events. In the unlikely event of a marine vessel capsize or hull breach, hydrocarbons will enter the marine environment and either vaporize, become entrained in the seawater, or, if met with an ignition source, would create combustion contaminants, including visible emissions and odors. Liquid and gaseous pollutants can also be released during the vessel refueling process and as breathing losses from both onboard and onshore storage tanks. The possibility of hydrogen releases from buoy lead-acid batteries exists but is negligible.

Vessel operations during activities will be limited in scope and short in duration. Most of the routine emissions from normal vessel operations will be emitted more than 20 miles offshore and will be diluted by normal atmospheric mixing action prior to heading to shore. Emissions will be indistinguishable from those of other marine vessels traversing offshore Morro Bay and will not significantly impact the air quality in San Luis Obispo County, and therefore not affect EJ.

Limited English Proficiency (LEP)

Limited English Proficiency refers to persons who are not fluent in English. Hispanic and/or Latino comprise 22.5 percent of the population of San Luis Obispo County, and approximately one-half of the linguistically isolated households in the county speak Spanish. During the G&G operations in the Morro Bay WEA, the frequency with which LEP individuals come in contact with aspects of this Federal action is expected to be minimal. The importance of the G&G operations will be moderate because the activity may lead to the construction and operation of wind energy facilities offshore Morro Bay. Translation of vital documents and interpretation of vital information may be provided at BOEM’s discretion and in accordance with resource availability.

Conclusion

- Due to the limited scope and short duration of the proposed project activities, the project is not expected to cause any significant adverse effects in the communities surrounding Morro Bay, nor in any other portions of San Luis Obispo County. Therefore, no significant disproportionately high adverse human health or environmental effects on minority and low-income populations are expected.

- The population of the affected area is overwhelmingly non-Hispanic white, and the proportions of minorities and persons in poverty are all below California percentages.
- Two of the basic tenets of environmental justice are disclosure and public participation. There is a significant Hispanic population in San Luis Obispo County, and a significant number of people may have LEP. This potential problem may be resolved by providing translation and interpretation services to the public, as needed, and as resources permit.

3.11.3 No Action Alternative

Under the No Action Alternative, leases and grants would not be issued for the Morro Bay WEA and there would be no G&G activities pursuant to conducting wind energy activities. Adoption of the No Action Alternative would have negligible impacts on minority and low-income populations in San Luis Obispo County. Ambient concentrations of air contaminants would remain unchanged, subject to future changes in the economy, regulations, technology, and population.

The site assessment and site characterization activities occurring within the WEA would not have disproportionately high or adverse environmental or health effects on minority or low-income populations.

3.12 TRIBES AND TRIBAL RESOURCES

3.12.1 Affected Environment

A number of Tribes have ancestral and current connections to central California coasts, offshore areas, and marine species and ecosystems. Tribes' connections to the region include their traditional and ancestral homelands, customary uses of marine resources for food and cultural connections, and stewardship of resources and ecosystems within their ancestral homelands and waters (NCTC 2015; Cordero et al. 2016). Coastal landscapes and seascapes, including viewsheds, are integral and sacred elements of Tribal cultural connections to the region. Additionally, as discussed in Section 3.13 Historic Properties before the last rise in sea levels, the coastline of the region extended beyond the present-day coast to include now-submerged areas that were likely inhabited by ancestors of California Tribes.

Coastal and offshore areas of central California near Morro Bay and the Morro Bay WEA are within or near the traditional cultural regions of several Tribes and cultural groups. These include Chumash-, Salinan-, and Esselen-affiliated Tribes. Chumash-affiliated Tribes identified on the California Native American Heritage Commission (NAHC) digital atlas are the Barbareño/Ventureño Band of Mission Indians, Chumash Council of Bakersfield, Coastal Band of the Chumash Nation, Northern Chumash Tribal Council, San Luis Obispo County Chumash Council, Santa Ynez Band of Chumash Indians, Tejon Indian Tribe, and yak tityu tityu yak tithini – Northern Chumash Tribe (NAHC 2021a). Salinan-affiliated Tribes are the Salinan Tribe of Monterey, San Luis Obispo Counties and the Xolon-Salinan Tribe (NAHC 2021b). Esselen-affiliated Tribes are the Esselen Tribe of Monterey County and the Ohlone/Costanoan-Esselen Nation (NAHC 2021c). Cultural affiliations of Tribes listed by the California NAHC are self-reported by Tribes (NAHC, 2021a, b, c). Among the Tribes identified by the NAHC in the Morro Bay region, one Tribe, the Santa Ynez Band of Chumash Indians, is Federally recognized (the Tejon Indian Tribe, located farther inland, in Kern County, is also Federally recognized).

Chumash ancestral territory encompasses approximately 7,000 square miles on the central California coastline from what is today Malibu to Paso Robles, including the four northern Channel Islands, and

inland to the western edge of the San Joaquin Valley (SYBCI 2021a; UXL 2008). The Chumash were traditionally, and continue to be, inextricably connected to the marine environment. They are recognized as one of the few ocean-going indigenous peoples on the California coast (NCTC 2015), travelling to sea, to the Channel Islands, and along the coast in traditional redwood plank canoes called tomols. Coastal Chumash traditionally harvested an array of marine resources such as abalone and other shellfish, Olivella shells, fish, kelp and other seaweeds, and marine mammals (Kennett 2005). A number of Chumash individuals and organizations describe the importance of coastal areas of the central California region to Chumash culture and work to revive coastal- and ocean-based cultural traditions: “Chumash descendants are in the midst of a cultural revival that is a testament to their rich cultural heritage... The Chumash way of life is interwoven with the ocean and the many clans who still exist and thrive on the Central Coast. Today, Chumash people celebrate their ancestral ocean voyages in tomol canoes to honor their ancestors’ crossings to the offshore islands and continue to honor ceremonial sites within their historic areas.” (NCTC 2015; p. 9). Coastal and marine-based cultural activities include a renewal of tomol voyages from the mainland to Santa Cruz Island and associated ceremonies, among other activities (Cordero et al. 2016). The Chumash are a maritime culture, and the tomol crossings are significant to Chumash culture and the restoration of Chumash maritime heritage (Cordero 2021; Pagaling 2018; NCTC 2015). Representatives of Chumash Tribes have expressed to BOEM that many locations along the central coast region are considered sacred places (BOEM and CEC 2021). In particular, Morro Rock and the surrounding waters has been identified as a culturally significant place (BOEM and CEC 2021). The Channel Islands and surrounding waters and Point Conception are also identified as significant places for Chumash Tribes (NCTC 2015; Cordero et al. 2016). Tribes often choose to hold sacred or culturally important places confidential, and BOEM recognizes that many other coastal and offshore locations are important to Tribes. The mention of a few publicly identified locations here is not intended to imply these are the only important places.

The ancestral territory of Salinan-speaking groups covers the areas of the central California coast inland to the Temblor and Diablo ranges, including the Santa Lucia range and the areas encompassing the Salinas River (Xolon Salinan Tribe 2019; Salinan Tribe of Monterey and San Luis Obispo Counties 2020). The Salinan were a hunter-gatherer society who utilized abundant resources, such as acorns, pine nuts, and sage seeds, and a variety of land and marine animals (Chung 2018; Taylor ND). Among the first Native Americans in California to be impacted by Europeans, the establishment of Missions by the Spanish in the region greatly disrupted the lifeways and social structures of Salinan cultural groups (Taylor ND; Rivers and Jones 1993). Present-day Salinan-affiliated Tribes and individuals work to maintain cultural practices connected to the natural environment (Salinan Tribe of Monterey and San Luis Obispo Counties 2020; Xolon Salinan Tribe 2019). In addition to other culturally important places in the central California region, Morro Rock, and the surrounding Morro Bay area, is identified as a sacred place by many Salinan (Herrera 2017; Shuman 2021; Taylor ND). Farther north of the Morro Bay WEA, the cultural region of Esselen-affiliated Tribes covers areas of the Monterey Bay region, including the Monterey Peninsula, the northern Salinas Valley, the Santa Lucia Mountains and Carmel Valley, and the Big Sur coast (Lavery 2003; ETMC 2021a; OCEN 2021). Many descendants of several villages and bands in the region have chosen to enroll in the state-recognized Tribes of the Ohlone/Costanoan-Esselen Nation or the Esselen Tribe of Monterey County.

Tribes in central California were displaced from much of their ancestral homelands with the arrival of several waves of European, Mexican, and American colonists and settlers. Native bands in the central California coastal region were among the first indigenous peoples in California to encounter Europeans when Spanish explorers arrived in the mid-1500s. Chumash, Salinan, and Esselen peoples were heavily impacted by the establishment of several Spanish missions in the region in the late 1700s and later the

arrival of Mexican and American settlers and ranchers (Millikin and Johnson 2005; Chung 2018). The subsequent onslaught of disease, removals from homeplaces to missions, forced labor, and vigilante violence and genocide resulted in tremendous population declines and displacement from Tribal lands. Today, many of the Tribes in the central California region do not have formal ownership or management of lands within their ancestral territories. However, the Santa Ynez Band of Chumash Indians, has over 1,500 ac in Santa Barbara County in trust as a reservation (SYBCI 2021b). Other Tribes work with non-profit and government organizations to regain or protect areas of their homelands. The yak tityu tityu yak tihini – Northern Chumash Tribe includes regaining ancestral homelands as part of the mission of their non-profit organization (YTT Northern Chumash 2020). In 2020, the Esselen Tribe of Monterey County gained ownership of almost 1,200 ac of ancestral homeland through partnership with the State of California and a non-profit land conservancy (ETMC 2021b). In addition to efforts to regain or conserve ancestral lands, the Northern Chumash Tribal Council has been leading an effort for several years to advance establishment of a Chumash Heritage National Marine Sanctuary through the National Oceanic and Atmospheric Administration’s National Marine Sanctuaries program (NOAA 2021).

Many Tribes in the region include as their mission the preservation and revitalization of cultural heritage through traditional practices, language, customary gathering of natural resources, and other means (Salinan Tribe of Monterey and San Luis Obispo Counties 2020; Xolon Salinan Tribe 2019; ETMC 2021; SYBCI 2021a). Tribes work to protect sacred sites and artifacts through advocacy and formal regulatory processes (e.g., National Historic Preservation Act, Native American Graves Protection and Repatriation Act). Additionally, several Tribes indicate they identify as the original stewards and caretakers of their natural environment and recognize a cultural mandate to care for and maintain a relationship with traditional ecosystems (Cordero et al. 2016, NCTC 2015; ETMC 2021b). Some Tribes recognize an interconnection and relationship between humans and the natural world, including marine species and ecosystems. For example, “Chumash worldview holds that all living and non-living beings are relatives. This includes plants, animals, water, land, fire, wind, etc. Humans are neither at the apex nor the center of this worldview, but are part of a large extended family,” (Cordero et al. 2016, p. 187).

Tribes in central California are facing changing environmental conditions stemming from climate change and related processes and effects. Increases in extreme drought conditions and decreases in stream flows and groundwater levels impact Tribes that manage land or water resources. Drought and reduced stream flows also impact Tribal resources such as culturally important plant and fish species. For example, SYBCI noted the loss of steelhead in the stream that runs through their reservation land (Romero 2021). Shifts in species’ ranges away from Tribal lands or traditional use areas, and reduction of abundance of some species, impacts Tribes’ access to culturally important terrestrial and marine species including basketry materials, traditional medicines, and plants and seeds (Romero 2021; Brittain et al. 2011). Marine resources such as abalone, seaweed and sea grass, and Olivella shells have become less abundant from both overharvesting and changes in marine ecosystems relating to ocean warming and acidification (Cordero et al. 2016; Romero 2021). Reductions in abundance and loss of access to traditional marine and terrestrial species can strain Tribes’ efforts to maintain and revitalize traditional cultural practices. Additionally, changes in sea level and coastal erosion threaten Tribal cultural resources and culturally important places along coastlines. Increased wildfire frequency, size, and intensity, as well as extreme heat events, impact the health of Tribal members and put strains on Tribal resources (Wiecks et al. 2021). Climate change impacts experienced by Tribes are compounded and complicated by remaining effects of colonization, including Tribes’ loss of management of traditional lands and waters and a shift toward extractive models of resource management (Goode et al. 2018; Whyte et al. 2021).

3.12.2 Impacts of the Proposed Action

This analysis considers impacts from issuance of lease(s) in the Morro Bay WEA, site assessment activities, and site characterization. Development, construction, and operation of a wind farm is not included in this assessment; such activities would be analyzed following submission of a COP by a lease holder. Impacts on Tribes and Tribal resources of lease issuance, site assessment, and site characterization are assessed in the context of spatial and temporal considerations and the potential for avoidance or reduction of impacts through mitigation. The assessment of potential impacts to Tribes is informed by communications between Tribes and BOEM through a number of informational and consultation meetings broadly relating to offshore energy development in California over several years. While the topic of these meetings varied over time, the issues raised by Tribes are informative of potential impacts of energy development activities in the region. BOEM and California held several meetings with California Tribes to discuss potential issues and concerns related to offshore wind in general; these meetings and the issues raised are summarized in BOEM and CEC (2018) and (2021). In addition, a summary of Government-to-Government consultations with Tribes and other outreach to Tribal communities regarding the Morro Bay WEA is provided in Section 4.3, Consultation.

Tribal representatives have expressed to BOEM that Tribes identify themselves as part of their inter-related coastal ecosystems and they often consider impacts to other elements of the ecosystem to be impacts on the Tribe since they view everything as interconnected. As such, other impacts described throughout this EA may be of interest or concern to Tribes. Additionally, because the Morro Bay WEA is adjacent to the northern portion of the area nominated for the proposed Chumash Heritage National Marine Sanctuary, some Tribes would likely be interested in impacts of the Proposed Action on the marine sanctuary designation process. The National Oceanic and Atmospheric Administration Office of Marine Sanctuaries is considering designation of the proposed Chumash Heritage National Marine Sanctuary in accordance with the National Marine Sanctuaries Act designation processes (NOAA, OMS 2021). The Proposed Action would not impact the designation process for the proposed marine sanctuary.

Impacts on Tribes and Tribal resources in the region could occur through impacts on biological or archaeological resources important to Tribes from noise, bottom disturbance, and marine mammal entanglements. Tribes may also be impacted by nearshore survey vessel traffic and changes in coastal viewsheds.

3.12.2.1 Noise

In discussions with BOEM about offshore wind in California, some Tribal representatives expressed an interest in understanding the impacts of noise during site characterization surveys on marine species. Tribes may identify impacts to Tribal resources if fish, marine mammals, and other marine organisms are affected by noise produced during HRG surveys. As described in Section 3.7, Marine and Coastal Habitats and Associated Biotic Assemblages, impacts to fish and EFH from HRG surveys and vessels are expected to be localized and temporary in duration. No fish species are identified as potentially experiencing population-level impacts from HRG survey or vessel noise. Impacts to marine mammals, along with required mitigation measures to reduce impacts, are described in Section 3.8, Marine Mammals and Sea Turtles. Noise impacts on marine mammals from HRG surveys are expected to be negligible and consist primarily of short, intermittent behavioral effects on individual animals. Overall, impacts of noise on marine species potentially valued by Tribes are expected to be negligible to minimal. Throughout the leasing and site assessment process, BOEM will continue to engage with Tribes interested in HRG surveys, associated noise, and potential effects on marine organisms.

3.12.2.2 *Bottom Disturbance and Entanglements*

Bottom disturbance associated with seafloor and sub-bottom sampling, metocean buoy anchoring, and recovery of lost survey equipment has potential to impact Tribal resources through effects on submerged and buried archaeological sites and cultural resources, and through impacts on biological resources from benthic disturbance. As described in Section 3.13, Historic Properties, areas off the coast that were once above sea level may contain submerged landscapes that were once inhabited by pre-contact Native peoples. These paleolandscapes, and any potential archaeological and cultural resources they may contain, could hold cultural importance for central California Tribes. As identified in Section 3.13, Historic Properties, water depths in the Morro Bay WEA preclude potential for submerged paleolandforms or pre-contact archaeological resources, although cable route survey activities or recovery of lost survey equipment along cable routes have potential to impact such resources in shallower water depths (less than approximately 120 m (393 ft)). Impacts on archaeological resources from seafloor disturbance would be avoided or mitigated by the requirement for an archaeological survey prior to the occurrence of any seafloor disturbing activities within the lease area.

Section 3.4, Marine and Coastal Habitats and Associated Biotic Assemblages, describes impacts of bottom disturbance from site assessment and characterization activities on fish and invertebrates as being localized to the area of sampling or survey equipment recovery and the buoy anchors, and temporary in duration. In addition, Section 3.5, Marine Mammals and Sea Turtles, identifies potential impacts to marine mammals from entanglement with survey equipment or metocean buoy mooring systems to be discountable. Overall, impacts of bottom disturbance or entanglements from site assessment and characterization activities on potential Tribal resources are expected to be negligible.

3.12.2.3 *Vessels*

Vessels associated with site assessment and characterization have potential to impact Tribes through interference with Tribal uses of offshore areas for cultural activities. BOEM assumes vessels supporting surveys and metocean buoy installation would launch from an existing port facility in central California, and no additional onshore infrastructure would be needed. Depending on which port facilities are used, lease-related vessels may be temporarily visible from nearshore areas of Morro Bay, Point Conception, and other culturally important coastal locations. However, BOEM expects the types of vessels and the level of vessel activity transiting in nearshore areas to be mostly indistinguishable from the existing level of vessel activity. After departing ports, vessels would transit directly to the leased area(s) within the WEA, approximately 32 km (20 mi) from shore. Therefore, survey-related vessels would only be potentially visible from coastal locations for short periods of time and would not represent a change from exiting vessel activity observable from shore.

Survey vessels transiting from ports to the WEA lease area(s) also have potential to coincide with nearshore Tribal cultural activities including tomol voyages and customary harvest activities. In recent years, the Chumash community has celebrated crossings of a tomol from the mainland to Santa Cruz Island. The tomol crossing typically takes place in fall, and the route is approximately 20 mi (32 km) across Santa Barbara Channel. The tomol departs from Channel Islands Harbor in Oxnard and arrives at Swaxil (Scorpion Valley) on Limuw (now known as Santa Cruz Island). The tomol is typically accompanied by a support vessel that sets the course, hosts resting paddlers, and protects the tomol from vessel traffic (NOAA, NMS 2019). Depending on which port facility survey vessels depart from, there is potential for survey vessels to coincide with a tomol or its support vessel. However, given the limited level of vessel activity associated with site assessment and characterization activities, overlap between tomol crossings and survey vessels would likely be temporary and avoidable through communication

and coordination, and general vessel safety measures. Tomol crossings to date have been completed with co-occurring activities in the Santa Barbara Channel for offshore energy projects, shipping, commercial fishing, and recreational activities.

A number of Tribes in California maintain rights to customary subsistence and commercial fisheries, including marine fisheries and other harvest activities (Appendix C of West Coast Ocean Tribal Caucus 2020). As with other fishing groups, there is potential for Tribal fishers, and Tribal members participating in other customary gathering activities, to experience reduced efficiency from increased vessel congestion in ports and nearshore areas. Overlap between survey vessels and fishing and gathering activities is expected to be minimal because most survey activity would occur within the WEA, farther offshore from nearshore fishing or coastal gathering activities. The level of increased vessel activity and associated potential space-use conflicts with Tribal fishers and marine resource harvesters would likely result in few short-term occurrences or would be indistinguishable from existing levels of vessel activity in nearshore areas. Overall, impacts from vessel activities are anticipated to be negligible to minor given the limited total number of vessel trips expected in the context of existing levels of activity in the Morro Bay region.

3.12.2.4 Changes in Coastal Viewsheds

Changes in coastal viewsheds could impact Tribes for whom unobstructed coastal views hold important cultural and spiritual significance. However, at the lease issuance and site assessment and characterization phase, visual impacts on coastal viewsheds are not anticipated. The Morro Bay WEA is approximately 20 miles from shore, and the metocean buoy(s) is not expected to be noticeably visible from shore. A visual resource impact assessment of installed wind turbines would be included in the analyses of specific COP(s) should Lessee(s) choose to submit a COP.

Conclusion

Potential impacts to Tribes and Tribal resources from effects of noise, bottom disturbance, and entanglements on resources important to Tribes are expected to be negligible based on the impact assessment of these factors on fish, marine mammals, and historic properties. Impacts of increased vessel activity on Tribal uses of coastal and nearshore areas would be negligible to minor because vessel activity would likely be mostly indistinguishable from existing levels, or would be temporary, and would not extend beyond the immediate timeframe of survey activities. No impacts from changes in coastal viewsheds are anticipated for site assessment and characterization activities. Overall, impacts to Tribes and Tribal resources from the Proposed Action are expected to be negligible to minor.

3.12.3 No Action Alternative

Under the No Action Alternative, BOEM would not hold a lease sale within the Morro Bay WEA, and no lease-related site assessment and characterization activities would occur. Although leases would not be issued under the No Action Alternative, BOEM expects ongoing activities and planned actions, along with changing environmental conditions, to have continuing local and regional impacts on Tribes and Tribal resources over the timeframe considered in this EA.

Ongoing and expected future actions that may impact Tribes and marine Tribal resources include continued commercial and recreational vessel traffic, port utilization and maintenance, offshore oil and gas activities and decommissioning, commercial and recreational fishing, Department of Defense operations, and nearshore maintenance and development projects. These actions have potential to produce space-use conflicts or impacts on resource availability for Tribal members; however, such

impacts are, for the most part, expected to represent a continuation of existing conditions and impact levels. The largest current and anticipated future contributors to impacts on Tribes and Tribal resources stem from ongoing changes in environmental conditions related to climate change, combined with other factors. Such impacts include declines in abundance and availability of culturally important species, coastal erosion, and continuation of recent patterns of increased drought conditions and wildfire frequency and severity (Goode et al. 2018). Over the timeframe considered in this EA, impacts on Tribes and Tribal resources of ongoing activities and planned actions are expected to range from minor for most ongoing and planned actions, to moderate—with potential for more severe impacts—when considering climate change. Implementation of the No Action Alternative would not meaningfully reduce or increase ongoing impacts to Tribes and Tribal resources from existing and potential future actions.

4 Consultation and Coordination, and Stakeholder Comments

4.1 PUBLIC INVOLVEMENT

In May 2021 the White House, the Departments of the Interior and Defense, and the State of California jointly announced an agreement to advance areas for offshore wind off the northern and central coasts of California in line with the National goal of 30 gigawatts of offshore wind energy by 2030. The BOEM Pacific Regional Office convened the first California Intergovernmental Renewable Energy Task Force (Task Force) meeting on October 16, 2016. The Task Force is a partnership of members of state, local, and federally recognized Tribal governments and federal agencies. The Task Force first met in 2016 and serves as a forum to discuss stakeholder issues and concerns; exchange data and information about biological and physical resources, ocean uses and priorities; and facilitate early and continual dialogue and collaboration opportunities.

BOEM worked in partnership with the State of California to outreach and involve the public in wind energy planning offshore California starting in 2016. In addition to public comment opportunities, BOEM and the State of California organized additional outreach and engagement with Tribal Governments and public stakeholders in over 80 in-person meetings. An outreach document summarizes these activities through 2020 in the CA Offshore Wind Energy Planning Outreach Summary Report. An addendum was published in June 2021 to document the outreach from 2020.

4.2 SUMMARY OF PUBLIC COMMENTS

The Bureau of Ocean Energy Management (BOEM) conducted public scoping to inform the development of an Environmental Assessment (EA) on the Morro Bay Wind Energy Area (WEA). During the 60-day scoping period, BOEM hosted two virtual public scoping meetings to outline its formal environmental review process under the National Environmental Policy Act (NEPA) and to solicit public input on issues to be considered. The public scoping period ended on January 11, 2022. BOEM received 1,262 comments from the public, other state and federal agencies, and interested groups and stakeholders. This included 86 unique submissions and 1,175 form letters. All comments are available at www.regulations.gov under Docket No. BOEM-2021-0044. BOEM received comments on the following topics:

Purpose and Need for the Proposed Action

Several commenters said that the creation of wind farms, such as in Morro Bay, are fundamental to the transition away from fossil fuels, reduction of greenhouse gas emissions (GHG), prevention of irreversible damages from climate change, and mitigation of extreme weather events in California. Commenters noted the need for renewable power sources in California and that this project could be part of a transition from the use of fossil fuels to the use of renewable energies.

Response: The Purpose and Need of the Proposed Action, to facilitate the assessment of the environmental characteristics and wind energy potential of areas of the Outer Continental Shelf (OCS) of the Morro Bay WEA through the issuance of commercial leases, is described in Section 2 of the EA.

Scope of Analysis in the EA

Many commenters expressed concern or confusion about the scope of analysis in the EA. Several commenters asked that the EA include an analysis of the impacts of all phases of wind energy development, including the siting, construction, and operation of wind towers throughout their life cycle. Other commenters asked that the analysis in the EA include a discussion of onshore impacts from cable placement.

Response: As noted in Section 1.1, BOEM does not consider the issuance of a lease to constitute an irreversible and irretrievable commitment of agency resources; therefore, this analysis does not consider the impacts associated with the siting, construction, and operation of any commercial wind power facilities. Section 1.1 also notes that while site characterization activities that extend into state waters and onshore to ports or existing substations are a reasonably foreseeable result of a wind energy lease issued in the Morro Bay WEA, BOEM is not authorizing any activities in state waters and onshore areas and does not have regulatory authority to apply mitigation measures outside of the OCS.

Alternatives

Commenters requested that BOEM include an alternative to providing renewable energy for the Central California coast that does not rely solely on offshore wind. Other commenters suggested BOEM include an alternative to mitigate impacts to marine mammals. A few commenters argued for the selection of the “No Action” alternative if the analysis in the EA disclosed significant impacts.

Response: BOEM's description of and rationale for its range of alternatives is described in Sections 1.1, 1.3, and 1.4, and the Purpose and Need for the Proposed Action is described in Section 2. As explained in these sections, alternatives analyzed must meet the purpose and need of the proposed action, which is to facilitate the assessment of the environmental characteristics and wind energy potential of areas of the Outer Continental Shelf (OCS) of the Morro Bay WEA through the issuance of commercial leases within the WEA and granting of rights-of-way (ROWs) and rights-of-use and easements (RUEs). Sources of renewable energy other than offshore wind would not meet this purpose and need. All mitigation that BOEM determined appropriate for marine mammals in Appendix C.

Environmental Resources

Several comments expressed concerns about protection of avian and mammal species. Comments covered individual species analysis, collision, entanglement, displacement, and overall concerns regarding the impacts of climate change.

Response: Best management practices to mitigate impacts to birds are described in Section 3.9.2.2. All mitigation that BOEM determined appropriate for marine mammals is listed in Appendix C. If leases or grants are issued, BOEM may require the lessee to comply with these measures, as deemed appropriate at the time of review, through lease stipulations and/or as conditions of SAP approval.

Commercial, Tribal, and Recreational Fishing

Commenters brought up possible use conflicts in the WEA and how these could impact fishing. Commenters requested meaningful participation and more involvement in the general offshore wind process. Numerous commenters, including a form letter campaign, made general statements that raised concerns about the impact the Morro Bay Wind Energy developments would have on the economy of commercial fishermen. Others commented on potential navigation hazards in the Morro Bay harbor.

Response: Impacts to commercial fishing are described in Section 3.10.2, which notes that while space-use conflicts are possible, the area of effect would for most fisheries be confined to a small portion of the total area available for fishing and that potential effects to commercial fishing from the Proposed Action are expected to be temporary in duration (5 years or less). Maritime Navigation is discussed in Section 3.2. BOEM is currently working with the U.S Coast Guard on its “Pacific Port Access Route Study” (PACPARS) to evaluate safe access routes for the movement of vessel traffic along the western seaboard.

Comments Noted but Outside of the Scope of the Proposed Action

Many commenters had concerns about turbine technologies, their interface with the environment, and the impact of wind towers on the viewshed of coastal areas. Other comments included general requests for further analysis or data acquisition relating to the seafloor, the benthic environment, economics, water quality, and other resources.

Response: As noted in Section 1.1, BOEM does not consider the issuance of a lease to constitute an irreversible and irretrievable commitment of agency resources; therefore, this analysis does not consider the impacts associated with the siting, construction, and operation of any commercial wind power facilities.

4.3 CONSULTATION

4.3.1 Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA)

Section 7(a)(2) of the ESA requires each Federal agency to ensure that any action that they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the adverse modification of designated critical habitat. To satisfy its ESA obligations BOEM consults with NMFS and USFWS regarding potential impacts to listed species and designated critical habitat under each Service’s jurisdiction.

To ensure compliance with the Marine Mammal Protection Act (MMPA), per BOEM regulation 30 CFR§ 585.801(b), BOEM lease requirements will stipulate that lease holders must not conduct any activity under their lease that may result in an incidental taking of marine mammals until the appropriate authorization has been issued under the MMPA of 1972 as amended (16 U.S.C. 1361 et seq.).

BOEM has initiated consultation with NMFS and USFWS on biological surveys expected to occur on the lease areas. BOEM intends to complete the consultation before activities occur. If the Lessee intends to design and conduct biological surveys to support offshore renewable energy plans that could interact with ESA-listed species, the surveys must be within the scope of activities described in existing ESA consultations, or the Lessee must consult further with BOEM and the Services. Additional time should be allowed for consultation and/or permits authorizing proposed activities which are outside of the scope of existing consultations/authorizations.

BOEM assumes that all operators in the OCS will incorporate best management practices to minimize or eliminate potential effects from site assessment and site characterization activities to protected marine mammal and sea turtle species, including vessel strike avoidance measures, visual monitoring, and shutdown and reporting. These practices have been developed through years of conventional energy operations and refined through BOEM’s renewable energy program and consultations with NMFS. All

survey plans and site assessment plans will be reviewed by BOEM to ensure inclusion of appropriate avoidance measures.

The Lessee must comply with the protective measures identified by the Lessor through its ESA consultation process, as well as those prescribed by any relevant authorization under the MMPA. These measures may be updated as a result of statutory, regulatory, or other consultation processes, including but not limited to consultation under the Endangered Species Act or the Marine Mammal Protection Act. The Lessor will provide up-to-date information at the pre-survey meeting, during survey plan review, or at another time prior to survey activities as requested by the Lessee. At the Lessee's option, the Lessee, its operators, personnel, and contractors may satisfy these survey requirements related to protected species by complying with the NMFS-approved measures to safeguard protected species that are most current at the time an activity is undertaken under this lease, including but not limited to new or updated versions of the forthcoming ESA consultation, or through new or activity-specific consultations.

4.3.2 Essential Fish Habitat (EFH) Consultation

The Magnuson-Stevens Fishery Conservation and Management Act (as amended) requires Federal agencies to consult with NMFS regarding actions that may adversely affect designated Essential Fish Habitat (EFH). As for ESA, BOEM communicated with the NMFS California Coastal Office (EFH) that the appropriate consultation strategy will be following when more detailed, project-specific, information is available.

4.3.3 Coastal Zone Management Act (CZMA)

The Coastal Zone Management Act requires that Federal actions that are reasonably likely to affect any land or water use or natural resource of the coastal zone be “consistent to the maximum extent practicable” with relevant enforceable policies of the state’s federally approved coastal management program (15 CFR 930 Subpart C). BOEM prepared a Consistency Determination (CD) under 15 CFR 930.36(a) to determine whether issuing leases and site assessment activities (including the construction/installation, operation and maintenance, and decommissioning of meteorological buoys) in the Morro Bay WEA was consistent to the maximum extent practicable with the provisions identified as enforceable by the Coastal Zone Management Programs of the state of California. The California Coastal held an informational hearing in September 2022 and will hold a decisional hearing on April 7, 2022. Concurrence is needed prior to lease issuance and is issued by the California Coastal Commission.

4.3.4 National Historic Preservation Act

Section 106 of the NHPA (54 U.S.C. § 306108) and its implementing regulations (36 CFR 800) require Federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation an opportunity to comment. BOEM has determined that issuing commercial or research leases within the Morro Bay WEA and granting ROWs and RUEs within the region constitutes an undertaking subject to Section 106 of the NHPA (16 U.S.C. 470f) and its implementing regulations (36 CFR § 800) as the resulting site characterization and site assessment activities have the potential to cause effects on historic properties.

BOEM has implemented a Programmatic Agreement pursuant to 36 CFR § 800.14(b) to fulfill its obligations under Section 106 of the NHPA for renewable energy activities on the OCS offshore California. BOEM initiated consultation through letters on November 24, 2021, with the California State

Historic Preservation Office (SHPO), Advisory Council on Historic Preservation, and the following federally recognized Tribal Nation: Santa Ynez Band of Chumash Indians. BOEM further identified potential consulting parties pursuant to 36 CFR § 800.3(f) through a November 24, 2021, letter to over forty (40) non-recognized Tribal governments, certified local governments, historical preservation societies, and museums, which solicited public comment and input regarding the identification of, and potential effects on, historic properties for the purpose of obtaining public input for the Section 106 review (36 CFR § 800.2(d)(3)) and invited them to participate as a consulting party. BOEM will continue with the consultation process as the Draft EA circulates for Public Comment.

5 List of Preparers and Reviewers

The individuals responsible for preparing this EA are listed below:

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Susan Zaleski	Marine and Coastal Habitats and Associated Biotic Assemblages
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7 List of Appendices

A) Area ID Memorandum

B) Current and Reasonably Foreseeable Planned Actions

C) National Historic Preservation Act Section 106 (California Programmatic Agreement)

D) Typical Mitigation Measures for Protected Marine Mammal Species

APPENDIX A
Area ID Memorandum



United States Department of the Interior

BUREAU OF OCEAN ENERGY MANAGEMENT
WASHINGTON, DC 20240-0001

Memorandum

To: Director

From: Doug Boren
Regional Director, Pacific OCS Regional Office

DOUGLAS
BOREN

Digitally signed by
DOUGLAS BOREN
Date: 2021.11.10
16:25:49 -08'00'

Subject: Central California Area Identification Pursuant to 30 C.F.R. § 585.211(b)

I. Purpose

This memorandum documents the analysis and rationale used to develop the Morro Bay Wind Energy Area (WEA) offshore San Luis Obispo County, California for environmental analysis and consideration for leasing. Pursuant to Bureau of Ocean Energy Management's (BOEM) 2017 Program Delegations Handbook, the Director has final authority to designate WEAs at the end of the Area Identification (Area ID) process.

II. Area Identified

On October 19, 2018, BOEM published a Call for Information and Nominations for Commercial Leasing for Wind Power Development on the Outer Continental Shelf (OCS) Offshore California(2018 Call).¹ BOEM delineated three geographically distinct Call Areas in the 2018 Call: Morro Bay and Diablo Canyon off the central coast and Humboldt off the north coast. On May 25, 2021, the Departments of the Interior and Defense and the State of California announced identification of an area, known as the "Morro Bay 399 Area" that could support up to 3 gigawatts of offshore wind on roughly 399 square miles (255,487 total acres) off California's central coast within and adjacent to the 2018 Morro Bay Call Area. On July 29, 2021, BOEM delineated two extensions of the Morro Bay Call Area, known as the East and West Extensions and published in the *Federal Register* the "Commercial Leasing for Wind Power Development on the Outer Continental Shelf (OCS) Offshore Morro Bay, California – Call for Information and Nominations" (2021 Call).² This memorandum provides two options for the central coast WEA consisting of portions of the 2018 Morro Bay Call Area and the 2021 Call Area, as described in Table 1 and depicted in Figure 1a and Figure 1b. Option 1 for the WEA area is approximately 255,487 total acres (399 square miles) and located approximately 17 miles from shore; Option 2 is approximately 240,898 total acres (376 square miles) and located approximately 20 miles from shore.

¹ <https://www.boem.gov/sites/default/files/regulations/Federal-Register-Notices/2018/83-FR-53096.pdf>

² <https://www.govinfo.gov/content/pkg/FR-2021-07-29/pdf/2021-16134.pdf>

	<i>Acres</i>	<i>Installation Capacity (MW)³</i>	<i>Homes powered⁴</i>	<i>Power Production (MWh/year): 40% Capacity Factor⁵</i>	<i>Power Production (MWh/year): 60% Capacity Factor⁶</i>	<i>Max Depth (meters)</i>	<i>Min Depth (meters)</i>
Option 1	255,487	3,102	1,085,700	10,869,408	16,304,112	1,300	800
Option 2	240,898	2,924	1,023,623	10,245,696	15,368,544	1,300	900

Table 1: Morro Bay Wind Energy Area Option 1 and 2 Statistics

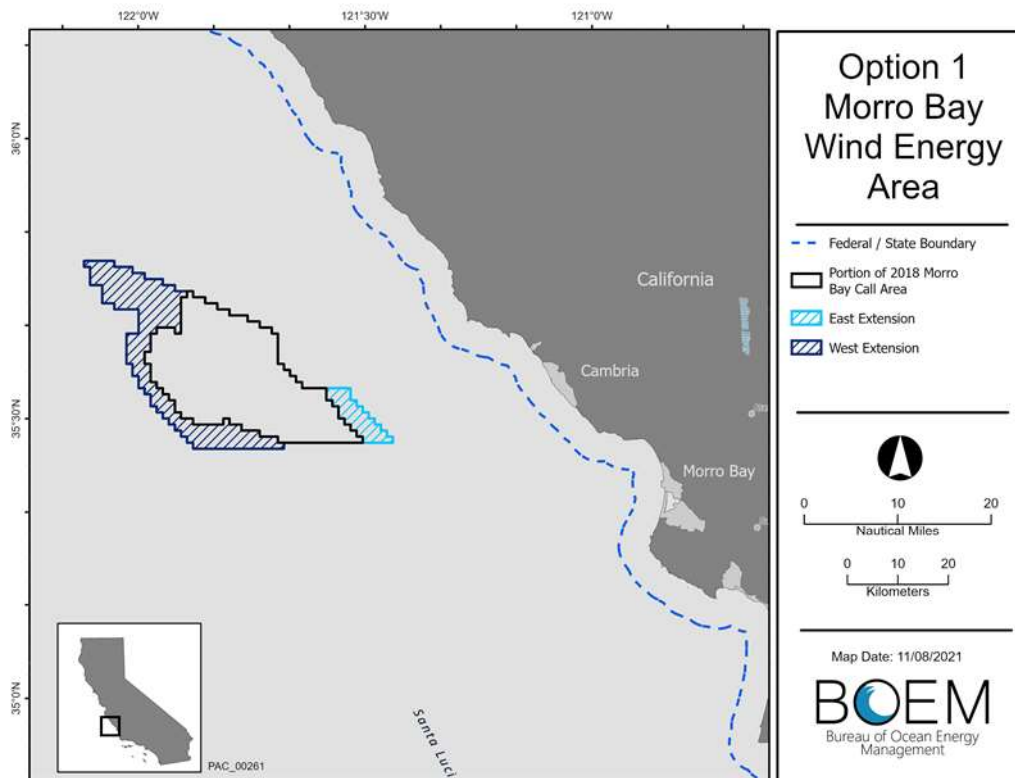


Figure 1a: Option 1 Morro Bay Wind Energy Area offshore California

³Megawatts (MW) based upon 3MW/sqkm

⁴ Based upon 350 homes per MW

⁵ Megawatt hours per year (MWh/yr) Formula = Capacity (MW) * 8760 (hrs/yr) * 0.4 (capacity factor)

⁶ Megawatt hours per year (MWh/yr) Formula = Capacity (MW) * 8760 (hrs/yr) * 0.6 (capacity factor)

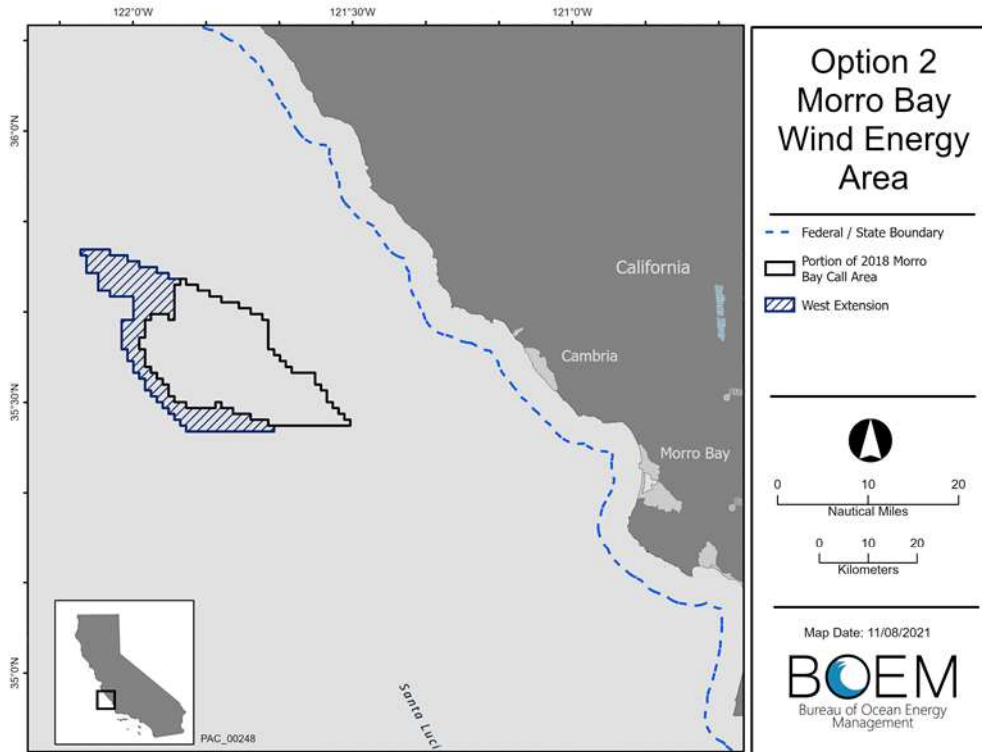


Figure 1b: Option 2 Morro Bay Wind Energy Area offshore California

III. Legal Standard

Pursuant to subsection 8(p) of the Outer Continental Shelf Lands Act (OCSLA), the Secretary of the Interior (the Secretary), in consultation with the U.S. Coast Guard (USCG) and other relevant Federal agencies, may grant a lease, easement, or right-of-way on the OCS for activities that produce or support production of energy from sources other than oil and gas (43 U.S.C. § 1337(p)(1)(C)). The Secretary must ensure that activities under this subsection are carried out in a manner that provides for 12 specific enumerated requirements, including safety, protection of the environment, and consideration of other uses of the sea or seabed. *Id.* § 1337(p)(4)(A)–(L). BOEM has issued regulations governing the leasing process and management of offshore renewable energy projects. *See* 74 Fed. Reg. 19,638 (Apr. 29, 2009); *see also* 30 C.F.R. part 585.

This memorandum documents BOEM’s consideration of OCSLA environmental and multiple use factors at the Area ID stage of its leasing process (43 U.S.C. § 1337(p)(4)(A), (B), (D), (F), (I), and (J)), Executive Order 13175 on Consultation and Coordination with Indian Tribal Governments⁷, and Department of Interior Policy on Consultation with Indian Tribes and Alaska Native Corporations.⁸ The identification of WEAs for environmental analysis does not constitute a final leasing decision, and BOEM reserves the right under its

⁷ Exec. Order No. 13175, 65 Fed. Reg. 67249 (November 9, 2000)

⁸ Department of the Interior 512 DM 4, <https://www.doi.gov/sites/doi.gov/files/512-dm-4-department-of-the-interior-policy-on-consultation-with-indian-tribes.pdf>

regulations to issue leases in smaller areas, fewer areas, different areas, some combination of these, or to issue no leases. BOEM will conduct further analysis under OCSLA and the National Environmental Policy Act (NEPA) at subsequent stages of its regulatory process, including if and when leases are issued, and if and when wind energy facilities are proposed on any leases.

IV. Description of the BOEM Process

A. Planning and Analysis

At the request of Governor Jerry Brown, BOEM established an Intergovernmental Renewable Energy Task Force (Task Force) with California in 2016 to facilitate coordination among relevant Federal agencies and affected tribal, state and local governments throughout the leasing process. Task Force meetings were held on October 13, 2016, September 17, 2018, March 9, 2020, and July 9, 2021.

Following the first Task Force meeting and through the leadership of the California Energy Commission (CEC), BOEM and the State of California engaged in a collaborative, data-based offshore wind energy planning process to foster coordinated and informed decisions about California's shared ocean resources and the many users who depend on them. This outreach consisted of numerous public meetings, webinars, and briefings with coastal communities, fishing communities, federally and non-federally recognized tribes, state and Federal agencies, academia and scientists, environmental non-governmental organizations (NGOs), and the offshore renewable energy industry. A summary of key findings is contained in the first Outreach Summary Report – California Offshore Wind Energy Planning, first published in December 2018 and includes a summary of outreach findings.⁹ Additional information gathered by BOEM and the State of California during the offshore wind energy planning process, including maps and spatially represented data, is available online at <https://caoffshorewind.databasin.org/>.

Data and information gathered during outreach efforts inform potential conflicts with existing ocean uses, viewshed, fishing, and indicate potential impacts to avian and marine mammal species, which generally increase with closer proximity to shore.

B. Call for Information and Nominations

The competitive lease issuance process starts with the publication of a Call, which requests comments from the public about areas of the OCS that it believes should receive special consideration and analysis for the potential development of renewable energy (30 C.F.R. § 585.211(a)).

On October 19, 2018, BOEM published a Call for Commercial Leasing for Wind Power Development on the OCS Offshore California.¹⁰ BOEM delineated the Call Areas in consultation with numerous parties and information sources, including the State of California and the Task Force. During the process of delineating the California Call Areas, BOEM

⁹ <https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/CA/Outreach-Summary-Report-September-2018.pdf>

¹⁰ <https://www.boem.gov/83-FR-53096/>

determined that certain areas would not be appropriate for leasing and development at this time and described the rationale used for determining the Call Areas in the Call. For example, BOEM eliminated areas closer to shore that indicate higher fisheries economic value and usage when initially selecting the call areas. BOEM also solicited public comment for three Call Areas in the Federal Register.¹¹ Two of these Call Areas were located on the Central Coast as shown in Figure 2 below.

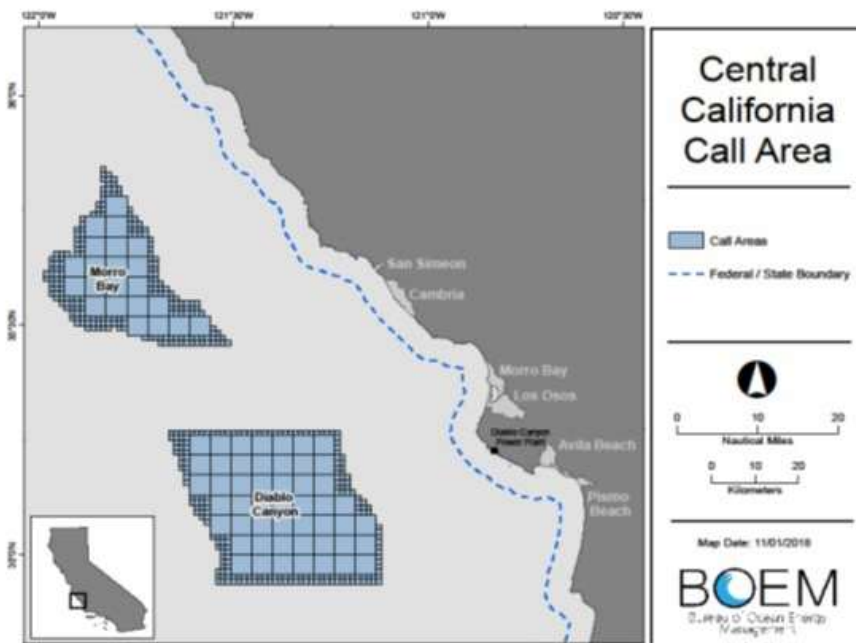


Figure 2: Central California Call Areas identified in 2018

Several concerns related to national security, military testing and training activities were identified by the Department of Defense (DoD) offshore California, including in the two Central California Call Areas. To address these concerns, the Departments of the Interior and Defense and the State of California participated in a series of discussions in 2019 and 2020 to determine if areas offshore the central coast may be compatible with military activities. These discussions focused on the Morro Bay Call Area identified in 2018. Several areas adjacent to the Morro Bay Call Area were identified as potentially compatible with military activities. These areas, known as “Central California Areas of Interest,” are shown in Figure 3 below. BOEM and the State of California collaborated to collect public comment and information on these areas. On February 7, 2020, the California Energy Commission (CEC) issued a Notice of Availability¹² (NOA) for public comment. On March 9, 2020, BOEM shared information on the areas at a Task Force meeting. A summary of key findings of this outreach through June 2021 is contained in BOEM’s second Outreach Summary Report - California Offshore Wind Energy Planning Addendum.¹³ Key concerns focused on potential

¹¹ <https://www.regulations.gov/docket?D=BOEM-2018-0045>

¹² https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/UPDATED-NOA-Outreach-on-Additional-Considerations_0.pdf

¹³ <https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Offshore-Wind-Outreach-Addendum.pdf>

negative impacts on existing ocean uses including commercial fishing, environmental and cultural resources, maritime vessel traffic, and coastal parks and tourism.

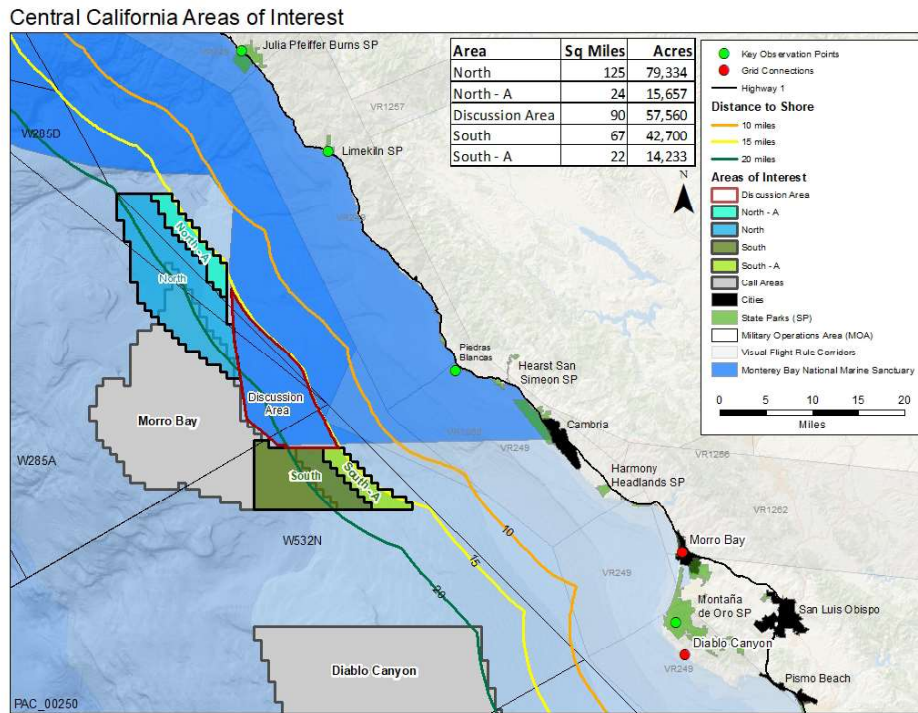


Figure 3: Central California Areas of Interest for additional consideration based on discussions with the Departments of the Interior and Defense and the State of California in 2019 and 2020

To contribute towards the Biden Harris Administration’s goal to deploy 30 GW of offshore wind by 2030 and achieve net zero emissions by 2050, on May 25, 2021, the White House, Departments of the Interior and Defense and the State of California announced identification of an area, known as the “Morro Bay 399 Area” that will support 3 gigawatts¹⁴ of offshore wind on roughly 399 square miles off California’s central coast, northwest of Morro Bay, enabling a path forward for areas within and adjacent to the Morro Bay Call Area. A map of the “Morro Bay 399 Area” is shown in Figure 4 below. Two portions of this area were not included in the 2018 Call and BOEM determined it would publish an additional Call to solicit additional public comment and any new nominations of interest.

¹⁴ A gigawatt is equivalent to 1,000 MW

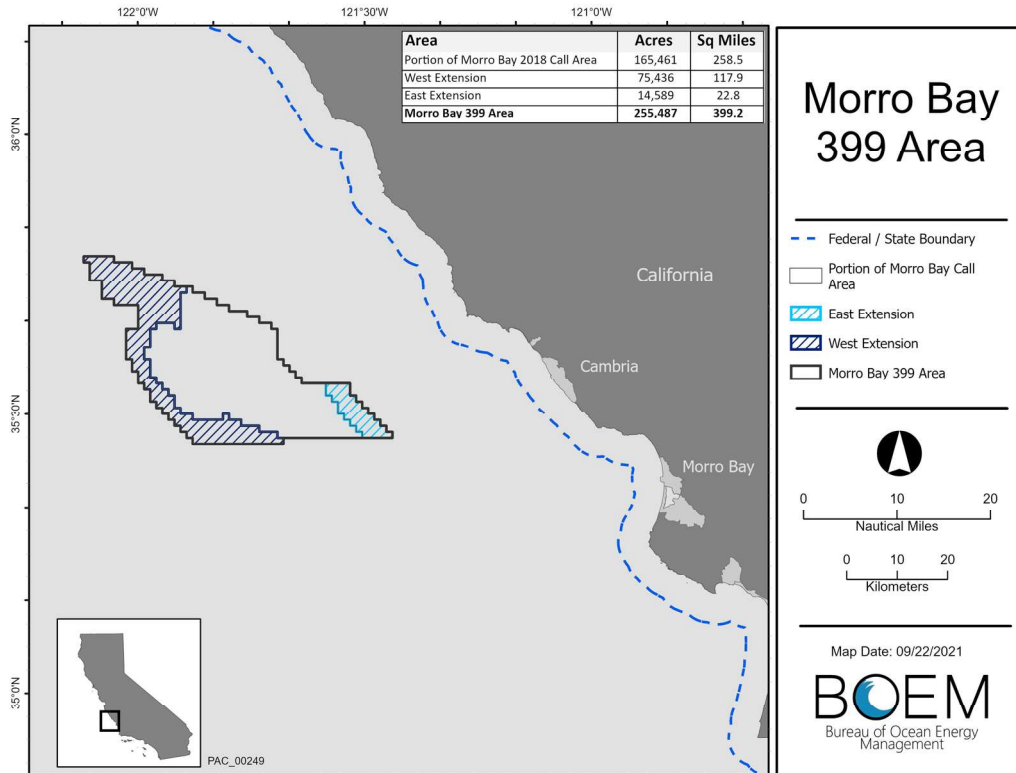


Figure 4: Morro Bay 399 Area consisting of portions of the Morro Bay Call Area and additional areas called East Extension and West Extension

On July 29, 2021, BOEM published an additional Call for Commercial Leasing for Wind Power Development on the OCS Offshore Morro Bay, California, East and West Extensions for public comment in the *Federal Register*.¹⁵ BOEM delineated two extensions of the 2018 Morro Bay Call Area, known as the “East Extension” and “West Extension” (Morro Bay Call Area Extensions). BOEM held meetings with the Task Force, the Pacific Fishery Management Council and federally recognized and non-recognized Chumash tribes describing the extensions. A map of the Morro Bay Call Extensions is shown in Figure 5 below.

¹⁵ <https://www.federalregister.gov/documents/2021/07/29/2021-16134/commercial-leasing-for-wind-power-development-on-the-outer-continental-shelf-ocs-offshore-morro-bay>

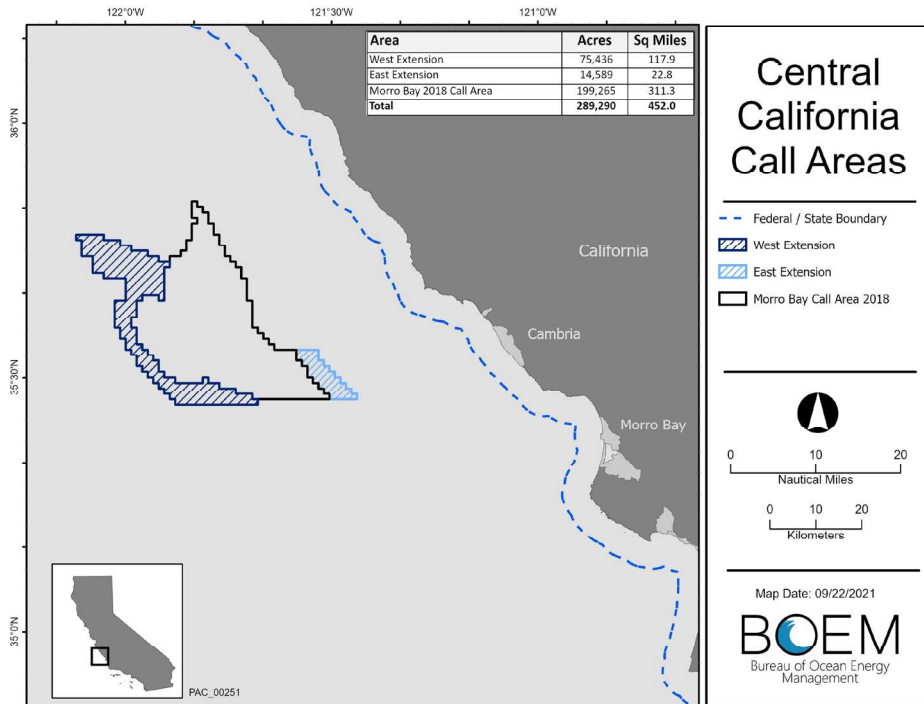


Figure 5: Morro Bay Call Area East and West Extensions with Morro Bay Call Area 2018 shown for reference

C. Area ID

Area ID is the second major step in the competitive wind leasing process and results in BOEM designating WEA(s) on which it will conduct an environmental review under NEPA for potential lease issuance. See 30 C.F.R. § 585.211(b). The goal of the Area ID process is to identify one or more OCS areas that appear most suitable for wind energy leasing and development. The objective of Area ID is to balance commercial project viability with potential impacts to the human, marine, and coastal environment, including consideration of existing OCS users. Subsection 8(p)(4) of OCSLA requires BOEM to strike a rational balance between Congress’s enumerated goals, i.e., a variety of uses. BOEM analyzes potential impacts of a specific proposed renewable energy facility in the identified areas during review of a proposed Construction and Operations Plan (COP), when project-specific information is available.

The Call comment period for the 2018 Call ended on January 28, 2019, and the Call comment period for the 2021 Call ended on September 13, 2021. BOEM received 118 comments and 14 nominations in response to the 2018 Call and 62 comments and 6 additional nominations in response to the 2021 Call. Comments received on both Calls are available at <https://www.regulations.gov/> [Docket No. BOEM–2018–0045] and [Docket No. BOEM-2021-0044]. Comments include submissions from tribal governments; private citizens; Federal, state, and local government agencies; environmental and other advocacy groups; industry groups; and wind developers. During the Area ID process, BOEM considered the following non-exhaustive list of information sources:

- Comments and nominations received in response to the 2018 Call
- Comments and nominations received in response to the 2021 Call
- BOEM California Intergovernmental Renewable Energy Task Force meetings
- California Offshore Wind Energy Planning Outreach Summary Report and Appendices¹⁶
- Input from state and Federal agencies
- Comments received via consultation meetings and written comment from federally recognized Tribes
- Comments from Tribal outreach meetings with federally and non-federally recognized Tribes, led by the California Energy Commission (CEC)
- Comments from relevant stakeholders, including the maritime community, environmental NGOs, offshore wind developers, and commercial fishing industry
- State and local renewable energy goals
- Domestic and global offshore wind market and technological trends
- California Offshore Wind Energy Gateway¹⁷ data and information (Data Basin)
- Outreach meetings and comments received under the CEC Notice of Availability of Outreach on Additional Considerations for Offshore Wind Energy off the Central Coast¹⁸
- California Offshore Wind Energy Planning Outreach Summary Report Addendum¹⁹

D. Environmental Review Process following Area ID

After the Area ID process, but prior to a lease sale, BOEM will conduct environmental review pursuant to NEPA to assess the potential environmental impacts associated with leasing some or all of the WEA.²⁰ The Area ID process informs the environmental review process by identifying and informing the geographic scope of that environmental analysis for any future lease sales in the area. If BOEM holds a lease sale for some or all of the WEA, the issuance of a lease would grant the lessee the exclusive right to submit for BOEM’s review a plan proposing development of the leasehold. The lease itself does not authorize any activity within the lease area. Therefore, BOEM does not consider the issuance of a lease to constitute an irreversible and ir retrievable commitment of agency resources toward the construction of a wind energy facility.

BOEM will perform an environmental analysis, typically in the form of an Environmental Assessment (EA), and conduct appropriate consultations before any lease sale. These analyses will primarily consider the potential impacts from site characterization activities

¹⁶ <https://www.boem.gov/California-Outreach-Summary-Report/>

¹⁷ <https://caoffshorewind.databasin.org/>

¹⁸ The original Notice of Availability of Outreach on Additional Considerations for Offshore Wind off the Central Coast of California (TN 231989) filed to the CEC’s Offshore Renewable Energy Docket on February 7, 2020 is available at: <https://efiling.energy.ca.gov/GetDocument.aspx?tn=231989&DocumentContentId=63852>

¹⁹ California Offshore Wind Energy Planning Outreach Summary Report, Updated June 20210; <https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Offshore-Wind-Outreach-Addendum.pdf>

²⁰ 42 U.S.C. §§ 4321 *et seq.*

(such as biological, geological, geotechnical, and archaeological surveys) and site assessment activities (such as meteorological and oceanographic buoy deployment).

NEPA encourages agencies to have an open process to determine the scope of environmental analysis.²¹ Accordingly, BOEM will initiate public scoping for environmental analysis upon the announcement of WEAs and will solicit public input on the environmental analysis. The EA and associated consultations may also lead to the identification of lease stipulations that would reduce or eliminate environmental impacts associated with site characterization and site assessment activities.

E. Future Steps in BOEM Leasing Process

If BOEM decides to move forward with the leasing process upon completion of its environmental analysis, BOEM would publish the proposed area(s) for lease, associated terms and conditions, and a proposed format of the competitive auction in a Proposed Sale Notice (PSN) issued pursuant to 30 C.F.R. § 585.216. A formal public comment period follows issuance of the PSN. BOEM will review any comments received to help develop the final lease sale terms and conditions published in the Final Sale Notice (FSN). BOEM may use information from its environmental analysis, as well as information gathered in response to the PSN, to further refine lease areas and develop lease terms and conditions.

If a lease is issued and a lessee submits a COP on that lease, BOEM would perform the necessary consultations with the appropriate state, federal, local, and tribal governments solicit input from the public and Task Force members; and perform an independent, comprehensive, project-specific environmental analysis under NEPA. This separate project-specific environmental analysis for a COP would provide additional opportunities for public involvement. BOEM would use this information to evaluate the potential environmental impacts and related socioeconomic considerations associated with the proposed project, which would inform its decision to approve, approve with modification, or disapprove a lessee's COP pursuant to 30 CFR § 585.628.

V. Background on the Call Area

A. California's Renewable Energy Goals

The State of California is the most populous state in the United States and home to an estimated 39 million people²² and two of the top ten largest metropolitan population centers in the United States,²³ representing significant energy demand. In 2002, the State of California established a Renewables Portfolio Standard (RPS), which mandates that a certain percentage of the state's energy must be generated from renewable resources. California expanded the RPS in 2015 through passage of California Senate Bill 350, the Clean Energy and Pollution Reduction Act, and in 2018 through passage of California Senate Bill 100 (SB 100). SB 100 increases the state's existing RPS to 50 percent by 2025 and 60 percent by 2030 and requires that 100 percent of the State's electricity be generated using zero-carbon resources by December 31, 2045. California's RPS is one of the most ambitious renewable

²¹ 40 C.F.R. § 1501.9.

²² https://factfinder.census.gov/faces/nave/jsf/pages/community_facts.xhtml

²³ https://www.census.gov/content/dam/Census/newsroom/releases/2015/cb15-89_graphic.jpg

energy standards in the country.

In addition, California aims to be carbon-neutral by 2045.²⁴ Because of these state policies and goals, California has been investing heavily in renewable energy generation since 2014, primarily in solar energy. At the same time, California is decreasing its generation of nuclear energy, and forecasts that the last nuclear power plant in the state will be offline by 2025,²⁵ representing a loss of approximately 10% of in-state energy production.²⁶

Diversifying renewable energy generation can help reduce the cost for California to meet its renewable energy targets, and offshore wind can complement the state's vast solar and land-based wind resources. Figure 6 shows how offshore wind may help mitigate challenges associated with the "Duck Curve."²⁷ This figure shows net loads (modeled loads minus land-based wind and solar generation) on March 31 in years 2012 – 2020.²⁸ As more solar generation is added to the grid during this time, it is able to meet an increasingly large portion of daytime load, but the grid also requires increasing amounts of other generation to ramp up and meet evening peaks as the sun goes down. Preliminary investigation of possible California offshore wind sites indicates that available offshore wind peaks in the late afternoon into the evening, with substantial generation throughout the evening hours. Diversifying the state's renewable energy portfolio with offshore wind could reduce evening ramping requirements and ease achievement of the state's goal of 100% carbon free electricity by 2045.²⁹

²⁴ California Senate Bill No. 100, approved September 10, 2018.

https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100

²⁵ California ISO website, https://caiso.com/Documents/AnnouncedRetirement_MothballListPosted.html.

²⁶ California Energy Commission website,

https://ww2.energy.ca.gov/almanac/electricity_data/electric_generation_capacity.html

²⁷ The Duck Curve is a graph of power production over the course of a day that shows the timing imbalance between peak demand and renewable energy production. The term was coined in 2012 by the California Independent System Operator.

²⁸ California Independent System Operator, 2016. *Fast Facts: What the Duck curve tells us about managing a green grid*. Folsom, CA. https://www.caiso.com/Documents/FlexibleResourcesHelpRenewables_FastFacts.pdf

²⁹ Ibid, 20.

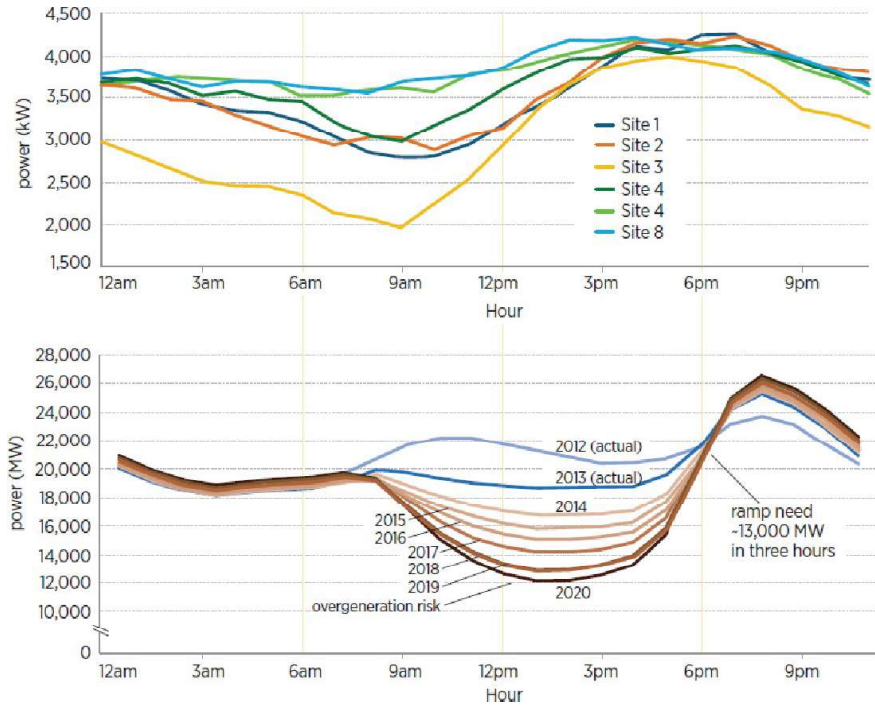


Figure 6: The “Duck Curve” and modeled generation profiles for 6-MW offshore wind turbines at six California sites

B. Technical Criteria: A Buildable Environment

Central California meets key technical criteria used to determine the feasibility of floating offshore wind development. These include sustainable wind speeds, suitable water depths, access to existing transmission interconnections and robust local renewable energy demand. Specifically, annual wind speeds of 8 to 10 meters per second are found in the Morro Bay Call Area, as depicted in Figure 7, which exceeds average speeds of several commercial developments in the North Sea.³⁰

³⁰ Analysis of wind speed observations on the North Sea Coast. (1998, February) Journal of Wind Engineering and Industrial Aerodynamics. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0167610597002857?via%3Dihub>

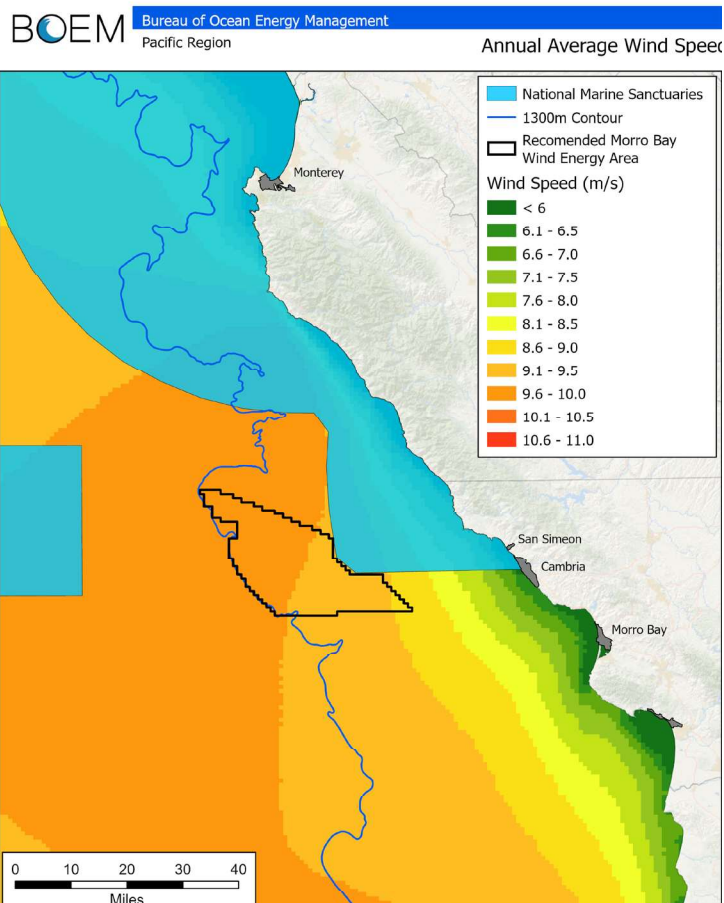


Figure 7: Estimates of the Annual Average Wind Resource (Speed) for the Morro Bay WEA

The water depth, which ranges between 865 and 1,300 meters, is technically feasible for several types of floating foundations.³¹ These water depths make pile-driven foundations (e.g., monopile or jacket) infeasible based on current technology in any of the previously mentioned Call Areas.

C. Nominations

In response to the 2018 Call, BOEM received nominations from 14 qualified entities and received nominations from 6 qualified entities in response to the 2021 Call, proposing to develop offshore wind in the California Call Areas listed below. Several companies noted in their submissions that, while they were nominating a specific area, they would be interested in any area that BOEM offered to lease offshore California. An asterisk (*) following the names below indicate response to the 2021 Call.

1. Algonquin Power Fund (America) Inc.

³¹ Ibid.

2. wpd Offshore Alpha, LLC
3. Avangrid Renewables, LLC
4. Castle Wind, LLC
5. Cierco Corporation
6. EDF Renewables Development, Inc.
7. EDP Renewables North America, LLC
8. E C & R (eON) Development, LLC
9. Equinor Wind US, LLC
10. Mission Floating Wind, LLC
11. Northcoast Floating Wind, LLC
12. Northland Power America, Inc,
13. Redwood Coast Energy Authority (RCEA)
14. U.S. Mainstream Renewable Power, Inc.
15. Orsted North America, Inc. *
16. JERA Renewables NA, LLC *
17. Arevia Power, LLC *
18. Marubeni Power International Inc.*
19. 547 Energy LLC*
20. Central California Offshore Wind LLC*

Additional information about nominations received by BOEM, including maps, nomination rationale and OCS block tables are available here: <https://www.boem.gov/California-Call-for-Nominations/>. s.

VI. Considerations for Area ID

A. Existing Uses and Considerations

BOEM considered multiple existing uses of the California coast in developing the WEA and identified several potential conflicts between offshore wind development and existing uses. The WEA appears to have lesser conflict than other potential areas that could support offshore wind energy development in California. BOEM will continue to assess potential environmental impacts throughout its process to determine if potential impacts could be avoided, reduced or mitigated prior to leasing or project construction. The uses found to interact most with potential offshore wind development in and around the Morro Bay Call Area are: (1) commercial and recreational fishing, (2) maritime navigation, and (3) DoD activities. Additional considerations BOEM examined in developing the WEA include: (a) historic properties, (b) visual impacts, (c) places and resources of importance to Tribes, (d) marine mammals and sea turtles, and (e) other infrastructure. Highlights of our internal analysis are included in the sections below.

1. Commercial and Recreational Fishing

Fishing is not prohibited by BOEM within wind energy areas, however, potential impacts from offshore wind development are considered throughout the process. Comments received by BOEM during the 2021 Call, recommended that BOEM remove the East Extension due to fishing activities closer to shore. Fishing activities are broadly considered during Area ID to ensure that major conflicts are identified and addressed to the extent practicable. Further outreach and consideration of fishing issues will continue throughout the several phases of the BOEM process. Floating wind facilities are likely to be incompatible with certain gear and fishing methods that are used in the deeper waters offshore California (e.g., trawl, pot/trap, longline, nets). Studies are underway for floating wind facilities in Europe, which will contribute to a better understanding of whether fishing methods that employ hook-and-line gear (jigs, bait, or trolling) may be compatible with offshore floating wind turbines. Recreational fishing is not expected to be negatively affected by offshore wind development in the Call Area because recreational fishers rarely fish in areas where water is deeper than 200 meters,³² much shallower than depths within the Call Area.

Given the ubiquity of fishing activity along the Pacific Coast,³³ no single exclusion area or mitigation approach would resolve all potential commercial fishing conflicts. Some areas important to one sector of the industry may not be important to others, and currently no available information indicates unique fishing grounds within the Call Area that are either marginal or notably valuable. Moreover, and as discussed further below, fisheries economic productivity declines with depth and distance from shore.

BOEM will continue to study the exact types of fishing and areas that are of most concern and work with industry, state, and the fishing community to mitigate concerns. Fishing information, including maps and spatially represented data, gathered during the offshore wind energy planning process is available online at:

<https://databasin.org/galleries/ae21ddeb4fd642f1a382f96adc898dbe>.

The waters offshore California support numerous types of fishing, and stakeholders place high cultural and economic significance on these activities. Within the last decade (2010-2019), the ex-vessel value of all marine commercial fisheries within California averaged approximately \$226 million dollars per year (Table 2). Within this same period, the Morro Bay-area port complex (MBPC) contributed about 4% to this total in ex-vessel landings value among the nine port complexes defined by the State. Within the MBPC, commercial fishers primarily landed their catch at two harbors, Morro Bay and Port San Luis, and use several smaller locations with less consistency. Sablefish and Dungeness crab dominate the value of landings at Morro Bay, and Dungeness crab and two species of nearshore rockfishes (Brown and Gopher) are most important at Port San Luis (Table 2). Twenty-one other taxa recorded at least 1% of value landed at one or more of the local harbors.

³³ Miller, R.R., Field, J.C., Santora, J.A., Monk, M.H., Kosaka, R., Thomson, C. 2017. Can. J. Fish. Aquat. Sci. 74: 1732-48.

³³ Miller, R.R., Field, J.C., Santora, J.A., Monk, M.H., Kosaka, R., Thomson, C. 2017. Can. J. Fish. Aquat. Sci. 74: 1732-48.

Fisheries economic productivity reflects biological productivity and is highest in shallower waters near the coast, declining as depth increases.³⁴ The approximate water depth range within the Morro Bay Call Area is between 860 meters and 1300 meters. Given the offshore and deep locations of the Call Area, a simple depth analysis reveals that many commercial fisheries are not likely to experience notable preclusion from fishing grounds as a result of wind energy development in the area (Table 2).

BOEM received several comments that specifically addressed fishing concerns in response to the 2018 and 2021 Calls. The National Marine Fisheries Service (NMFS) and fishing organizations, such as Responsible Offshore Development Alliance, submitted comments in 2018 that are also applicable to the western and eastern extensions. These and other comments raised concerns regarding the quality of existing fishing data and called for prioritization of improved fisheries data and increased resources for fisheries research and monitoring. BOEM will incorporate consideration of data needs identified by these commenters as new data acquisition initiatives and environmental studies advance.

The Pacific Fishery Management Council (PFMC) stated that the West extension overlaps with the PFMC-designated rocky reef Habitat Area of Particular Concern, as well as being completely within the Big Sur Coast/Port San Luis Essential Fish Habitat Conservation Area. These designations indicate areas that contain ecologically important habitat and may benefit from protection from human activities, including offshore wind energy installations.

The East Extension is closer to shore and, as noted elsewhere in this memorandum and in comments received, shallower water has relatively more fishing activity. The Alliance of Communities for Sustainable Fisheries requested removal of the eastern extension because of the relative increase in fishing activity in this area. The PFMC notes that this area was historically important for trawl harvest of dover sole and sablefish and is currently an important area for fixed gear sablefish harvest. Currently there is no large-scale market for groundfish trawl vessels; however, historic production from trawl vessels should be considered as a placeholder for future fisheries impacts. According to one commercial fisherman, during 1990-2006, 75 percent of the Morro Bay fleet's landings were from groundfish, one of the top three fisheries for that area. Comments received during BOEM's outreach indicate that the East Extension is of particular concern to the fishing industry. However, further outreach, data gathering, and analysis could provide BOEM with a more comprehensive understanding of the uses in the East Extension as final areas for leasing are developed.

Many commenters stated that BOEM should consider the cumulative impacts of pre-construction activities, construction, operations, and decommissioning of all foreseeable offshore wind projects. Some agencies and fishing and environmental organizations have suggested BOEM accomplish this through a Programmatic EIS that evaluates the entirety of BOEM's offshore wind leasing program on the west coast. PFMC specifically suggests a coastwide cumulative effects analysis of the totality of wind energy areas on fisheries, fishing communities, and impacts to domestic seafood production (including portside fishery-related

³⁵ A "traffic lane" is a more encompassing term, including TSSs, fairways, and other formally designated routing measures.

facilities and services). As part of BOEM's analysis of potential offshore wind energy facilities proposed on a lease, BOEM will evaluate impacts resulting from a proposed project to existing and reasonably foreseeable future uses of the coastal and ocean environment. This includes fishing; oil and gas exploration and development; military activities; marine mineral extraction; and commercial, recreational, and military vessel traffic. Coastwide cumulative impacts analysis, when it is possible, is most appropriate during the evaluation of construction and operation for a specific project. BOEM acknowledges these comments suggesting earlier and broader analyses, and will consider the feasibility of such an approach.

Finally, many comments, submitted primarily by commercial fishermen, requested BOEM conduct more inclusive and meaningful fishing industry collaboration. The PFMC also recommended further outreach to the fishing industry and provided BOEM with specific guidance on direct engagement with fishing stakeholders. The engagement would enable BOEM to incorporate their knowledge of fishing locations, effort and value on their fishing grounds, location of past and future fishing, and to better understand the socioeconomic effects of displacing them from their traditional fishing grounds. BOEM continues to apply specific tactics that reinforce and build strength and traction toward a comprehensive strategy of engagement with the fishing community, and appreciates the specific guidance provided during the public comment process. This comprehensive strategy and further outreach during the NEPA process for potential leasing will assist BOEM during the forthcoming stages of analysis.

Table 2. Ex-vessel value (2021\$) of landings for some California commercial fisheries.

	Average Annual Ex-vessel Landings Value (2021\$) 2010-2019*	Statewide Value %	Regional MBPC Value %	Local Harbor Value %	Depth (m) or Offshore Range (km) of Potential Fishing Grounds†	Call Area Overlaps with Potential Fishing Grounds?
California Statewide	\$ 225,829,270	100%				
Morro Bay Port Complex	\$ 9,285,995	4%	100%			
Morro Bay	\$ 6,984,695	3%	75%	100%		
Sablefish	\$ 2,122,075	1%	23%	30%	57 to 1524 m	Yes
Dungeness Crab	\$ 1,461,022	< 1%	16%	21%	less than 230 m	No
Market Squid	\$ 643,946	< 1%	7%	9%	less than 100 m	No
Thornyheads	\$ 442,973	< 1%	5%	6%	26 to 1524+ m	Yes
Chinook Salmon	\$ 345,726	< 1%	4%	5%	0 to 46 km offshore	Yes
Hagfishes	\$ 322,751	< 1%	3%	5%	9 to 732 m, generally less	No
Spot Prawn	\$ 289,953	< 1%	3%	4%	122 to 329 m	No
Swordfish	\$ 153,889	< 1%	2%	2%	EEZ and int'l waters	Yes
Gopher Rockfish	\$ 126,582	< 1%	1%	2%	less than 81 m	No
Ocean (Pink) Shrimp	\$ 116,961	< 1%	1%	2%	73 to 229 m	No
Cabezon	\$ 99,865	< 1%	1%	1%	less than 91 m	No
Petrale Sole	\$ 84,523	< 1%	< 1%	1%	18 to 458 m	No
Blackgill Rockfish	\$ 70,514	< 1%	< 1%	1%	88 to 768 m	No
Grass Rockfish	\$ 68,407	< 1%	< 1%	1%	less than	No
Black-and-Yellow Rockfish	\$ 66,809	< 1%	< 1%	1%	less than 37 m	No
All other species	\$ 516,627	< 1%	< 1%	7%		
Port San Luis	\$ 2,126,675	1%	23%	100%		
Dungeness Crab	\$ 574,225	< 1%	6%	27%	less than 230 m	No
Brown Rockfish	\$ 274,751	< 1%	3%	13%	less than 122 m	No
Gopher Rockfish	\$ 225,725	< 1%	2%	11%	less than 81 m	No
Chinook Salmon	\$ 181,411	< 1%	2%	9%	0 to 46 km offshore	Yes
Hagfishes	\$ 147,316	< 1%	2%	7%	9 to 732 m, generally less	No
Sablefish	\$ 97,275	< 1%	1%	5%	57 to 1524 m	Yes
Cabezon	\$ 94,876	< 1%	1%	4%	less than 91 m	No
Rock Crabs	\$ 92,525	< 1%	1%	4%	less than 100 m	No
Black-and-Yellow Rockfish	\$ 77,220	< 1%	< 1%	4%	less than 37 m	No
California Halibut	\$ 57,714	< 1%	< 1%	3%	less than 91 m	No
Lingcod	\$ 51,865	< 1%	< 1%	2%	less than 397 m	No
Grass Rockfish	\$ 44,686	< 1%	< 1%	2%	less than 46 m	No
Vermilion Rockfish	\$ 38,119	< 1%	< 1%	2%	less than 427 m	No
Treefish	\$ 35,300	< 1%	< 1%	2%	less than 46 m	No
Barred Surfperch	\$ 23,956	< 1%	< 1%	1%	less than 73 m	No
All other species	\$ 109,713	< 1%	< 1%	5%		
All other locations	\$ 89,809	< 1%	1%	100%		
Ridgeback Prawn	\$ 50,203	< 1%	< 1%	56%	46 to 300 m	No
Spot Prawn	\$ 19,428	< 1%	< 1%	22%	122 to 329 m	No
Market Squid	\$ 7,588	< 1%	< 1%	8%	less than 100 m	No
Rock Crab	\$ 2,297	< 1%	< 1%	3%	less than 100 m	No
Warty Sea Cucumber	\$ 1,761	< 1%	< 1%	2%	less than 100 m	No
Sablefish	\$ 1,093	< 1%	< 1%	1%	57 to 1524 m	Yes
California Halibut	\$ 1,073	< 1%	< 1%	1%	less than 91 m	No
Thornyheads	\$ 1,059	< 1%	< 1%	1%	26 to 1524+ m	Yes
California Spiny Lobster	\$ 927	< 1%	< 1%	1%	less than 91 m	No
All other species	\$ 4,380	< 1%	< 1%	5%		

* Landing data downloaded from <https://www.wildlife.ca.gov/Fishing/Commercial/Landings> and adjusted to June, 2021 values using the Consumer Price Index Inflation Calculator <https://data.bls.gov/cgi-bin/cpicalc.pl>.

† Depth data obtained from (1) status of the fisheries reports at <https://www.wildlife.ca.gov/Conservation/Marine/Status> for Blackgill Rockfish, Brown Rockfish, Cabezon, California Halibut, California Spiny Lobster, Dungeness Crab, Gopher Rockfish, Lingcod, Ocean (Pink) Shrimp, Pacific Hagfish, Petrale Sole, Ridgeback Shrimp, Spot Prawn, and Vermilion Rockfish; (2) Miller and Lea 1976, *Guide to the Coastal Marine Fishes of California*, Calif. Dept. Fish and Game, Fish Bull. No. 157, for Barred Surfperch, Black Hagfish, Black-and-Yellow Rockfish, Longspine Thornyhead, Sablefish, Shortspine Thornyhead, and Treefish; and (3) Miller et al. 2017, *CJFAS*, for Market Squid, Rock Crab, and Warty Sea Cucumber. Chinook Salmon offshore range obtained from Industrial Economics, Inc. 2012. BOEM OCS Study 2012-083. Original data converted to metric units when necessary.

Table 2: Ex-vessel Value of Landings for Some California Commercial Fisheries

2. *Maritime Navigation*

The majority of commercial vessels that traverse the Call Area carry automated identification system (AIS) transmitters. BOEM conducted a review of 2011 and 2017 AIS vessel information provided to BOEM from the USCG. AIS vessel traffic information is available online at: <https://databasin.org/maps/new#datasets=422db447c151412d918a3085b31429f8>.

BOEM analyzed AIS trackline and density data within the Call Areas to determine vessel traffic patterns and identify how they may conflict with potential offshore wind energy development. BOEM shared the findings with area operators and harbor safety committees and sought their comments. Three main areas of concern emerged: Vessels crossing the Morro Bay and Diablo Canyon Call Areas to enter the USCG Recommended Tracks within the Monterey Bay National Marine Sanctuary, deep draft vessels entering or exiting traffic lanes, and tug and towing vessels crossing the Call Areas.³⁵ Vessel traffic patterns moved closer to shore between 2011 and 2017 with changes to air quality regulations for vessels within 24 nautical miles from shore. More vessels traversed the Morro Bay Call Area in 2017 than in 2011 (Figure 8). The majority of AIS vessels traveling through the Morro Bay Call Area were cargo ships (Figure 9).

Maritime navigation-related comments received in response to the 2018 and 2021 Calls focus on navigational safety concerns and mariner access to established routes offshore California. Navigational safety comments included potential collision hazards with moveable floating wind turbines, decreased sea space to maneuver during adverse weather and shifts to existing vessel traffic patterns that could increase congestion in some areas. Several comments recommended BOEM avoid siting wind energy facilities near high-use commercial shipping routes. One commenter suggested the establishment of safety corridors to ensure safe distance between any future facilities and vessels.

Comments concerning mariner access include potential issues for vessels attempting to access two USCG Recommended Tracks located approximately 37 miles north of the Morro Ball Call Area. AIS trackline data of vessel traffic patterns confirm vessels transit areas adjacent to, and within, the Morro Bay Call Area, prior to entering these Recommended Tracks.

³⁵ A “traffic lane” is a more encompassing term, including TSSs, fairways, and other formally designated routing measures.

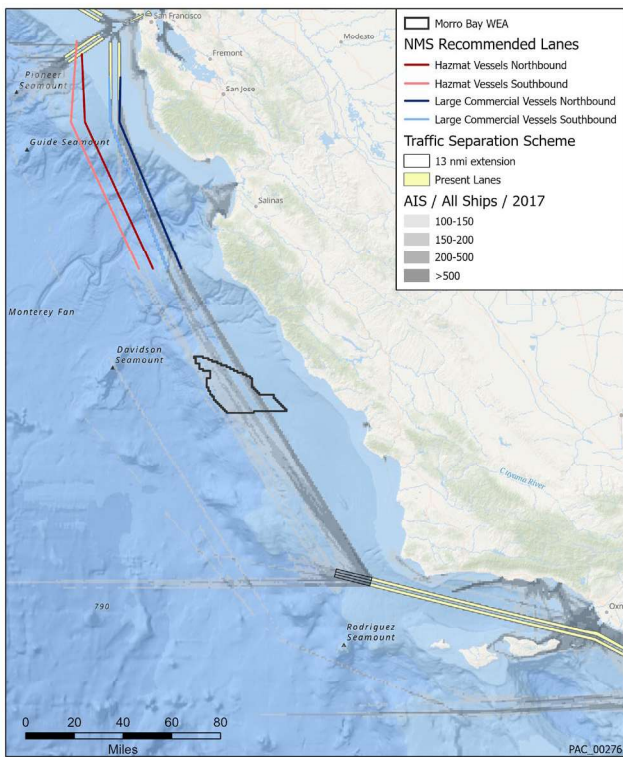
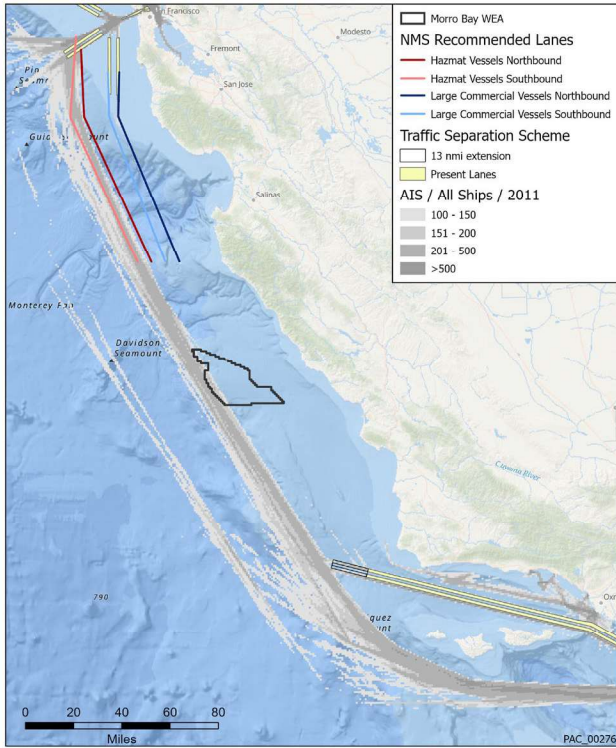


Figure 8: Number of AIS vessels traveling through an aliquot (1.2 x 1.2 kms) in 2011 and 2017. Only aliquots with greater than 100 vessels are shown to highlight high traffic areas

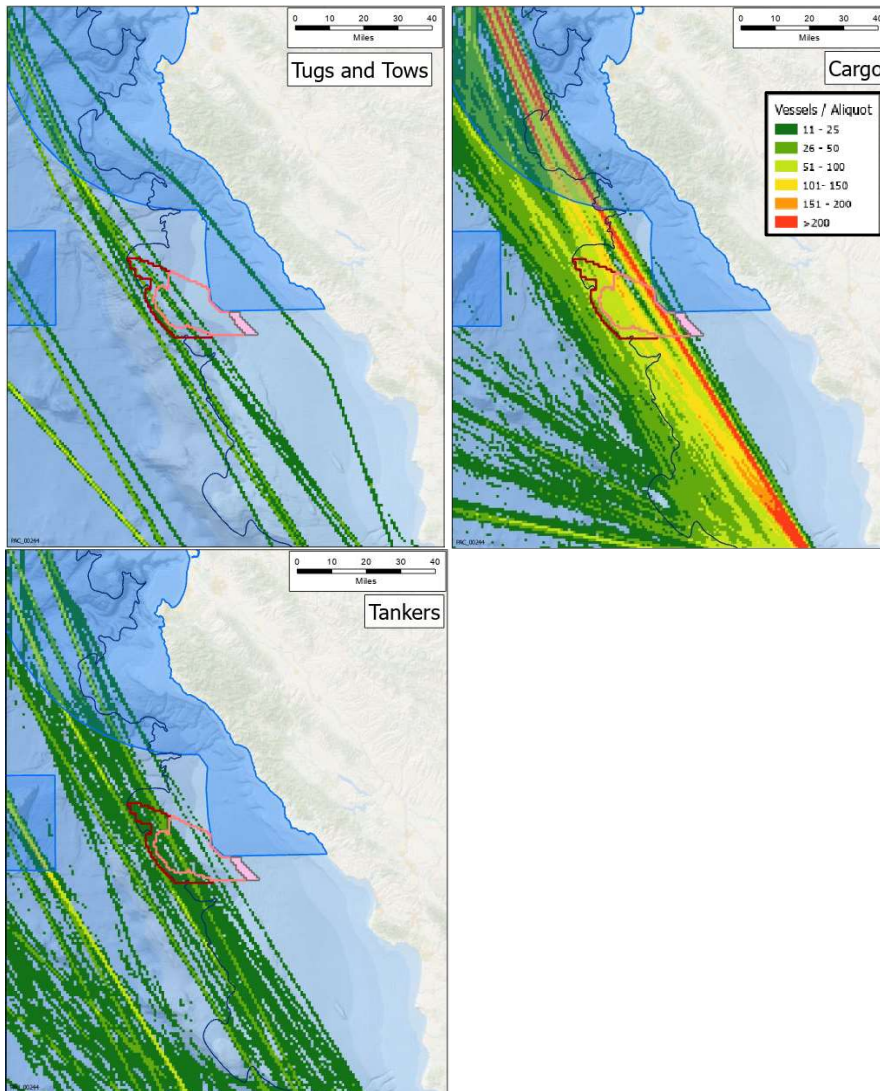


Figure 9: Number of AIS tankers, cargo ships, and tugs and tows traveling through an aliquot (1.2 x 1.2 kms) in 2017

On July 28, 2021, the USCG announced it will conduct a “Pacific Port Access Route Study”³⁶ (PACPARS) to evaluate safe access routes for the movement of vessel traffic proceeding to or from ports along the western seaboard to determine whether a Shipping Safety Fairway and/or routing measures should be established, adjusted or modified. The PACPARS will help the USCG determine what impacts, if any, the siting of offshore wind facilities may have on existing maritime users and any potential impacts to vessel traffic and maritime navigation. BOEM has coordinated closely with the USCG throughout its planning and siting process and will continue this coordination to address potential maritime impacts from any future offshore wind development.

³⁶ <https://www.regulations.gov/document/USCG-2021-0345-0001>

3. Department of Defense Activities

The DoD conducts offshore testing, training, and operations within and adjacent to the Morro Bay Call Area. Several concerns related to national security, military testing and training activities were identified by the DoD offshore California. As described in this memorandum, a working group which included DoD, BOEM, and NOAA Sanctuaries participated in a series of meetings to identify solutions off the Central Coast. Several areas adjacent to the Morro Bay Call Area were identified as potentially compatible with military activities. BOEM and the State of California collaborated to collect public comment and information on these areas. On May 25, 2021, the Departments of the Interior and Defense and the State of California announced identification of an area, known as the ‘Morro Bay 399 Area’ that will support 3 gigawatts of offshore wind on roughly 399 square miles off California’s central coast within and adjacent to the Morro Bay Call Area.

4. Additional Considerations

BOEM considered several other potential factors that influenced the spatial orientation of the WEA Options. These factors were addressed through the designation of the Morro Bay Call Area and Extensions, and will be further analyzed under NEPA and BOEM’s renewable energy authorization processes. These factors include historic properties; visual impacts; places and resources of importance to Tribes; the presence of marine mammals, avian and other protected species; and cables and other existing infrastructure. BOEM’s analysis of these factors is briefly described below.

a) Historic Properties

Based on the current understanding of sea level rise and the earliest date of human occupation in the western hemisphere, any submerged pre-contact period site in this area of the Pacific OCS would be located in water depths less than 130 m (427 ft) below sea level,³⁷ therefore, the potential for submerged pre-contact period sites is non-existent within the Morro Bay WEA.³⁸ A number of state parks historic properties and other protected areas are located along the coast near the Morro Bay WEA, including Hearst Castle State Park (also designated a National Historic Landmark), Piedras Blancas Light Station (also designated as an Outstanding Natural Area) and the nearby Elephant Seal Rookery, and Morro Rock, a popular coastal geologic feature that has significance to nearby tribes and is also adjacent to Morro Bay State Marine Recreational Management Area and Morro Bay State Marine Reserve. Also located near the Call Area are several state historic landmarks and sites listed on the California Register of Historical Resources. A more complete source of National Register-listed properties, along with properties that have been determined eligible for the National Register but not listed, may be found through the California Historical Resources Information System (CHRIS).

³⁷ J., J.X. Mitrovica, and J. Alder. (2014). Coastal paleogeography of the California–Oregon–Washington and Bering Sea continental shelves during the latest Pleistocene and Holocene: implications for the archaeological record. *Journal of Archaeological Science*, 52, 12-23. doi:10.1016/j.jas.2014.07.030

³⁸ ICF International, Davis Geoarchaeological Research, and Southeastern Archaeological Research. 2013. Inventory and Analysis of Coastal and Submerged Archaeological Site Occurrence on the Pacific Outer Continental Shelf. U.S. Department of the Interior, Bureau of Ocean Energy Management, Pacific OCS Region, Camarillo, CA. OCS Study BOEM 2013-0115. 280 pages, plus appendices.

Through BOEM's outreach efforts and comments received, concerns were raised of the potential alteration of the viewshed for Morro Rock and Hearst Castle. The number of affected historic properties and the extent of impacts depends on project siting and the lighting and marking of any structures. BOEM lists these measures in its draft guidelines, available on the BOEM website. Determining how impacts to historic properties and National Historic Landmarks can be reduced is very dependent on the proposal received. Under BOEM's phased process for renewable energy development, Section 106 of the National Historic Preservation Act and NEPA review of potential visual impacts from specific project proposal takes place after COP submittal. Generally, there is less impact to onshore historic properties (and the impacts more readily mitigated) the farther from shore the construction occurs due to environmental factors such as fog, haze, sea spray, and wave height. Section 110(f) of the National Historic Preservation Act (NHPA) requires that agency officials, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to any National Historic Landmark that may be directly and adversely affected by an undertaking. Additionally, as stated in the June 2021 Outreach Summary Report Addendum, more research on Morro Rock (including, but not limited to, archival research, ethnographic research, oral histories, and traditional knowledge) should be undertaken to better understand the potential impact of offshore wind development on this area.

b) Visual Impacts

During outreach meetings and in comments received in response to the 2018 and 2021 Calls, stakeholders raised concerns that visual impacts from turbines sited within view of onshore properties are of concern to the public. California protects public views by law 'as a resource of public importance', and coastal development is required to be sited and designed to protect views to and along the ocean. California state agencies stated in their comments the East Extension is potentially inconsistent with local scenic resource policies and recommended the area be removed from consideration until additional analysis of potential impacts from visibility of wind turbines from shore is completed. Visual impacts depend on project specifics, such as wind turbine number, size, spacing, and configuration, and, as such, it is more appropriate to conduct visual simulations when those details are known. However, in an effort to provide information to address these concerns, BOEM funded visual simulations (see <https://www.boem.gov/California-Visual-Simulation/>) that use a theoretical project configuration in the Morro Bay Call Area viewed from Piedras Blancas, a nearby lighthouse. Potential visual impacts and potential mitigation measures, such as paint colors and aircraft detection lighting systems, would be fully analyzed in coordination with the California agency partners if a lease(s) is issued and a COP(s) is submitted. Although BOEM could potentially reduce visual impacts by removing the Eastern Extension at this time because it is closer to shore, it may be premature to exclude areas at the Area ID stage based on potential visual impacts alone.

c) Places and Resources of Importance to Tribes

During consultation meetings, joint tribal outreach meetings,³⁹ and in written comments, federally and non-federally recognized tribes raised concerns about potential impacts to sites and places considered sacred, protection of artifacts and cultural resources, and potential impacts from onshore activities (i.e., cable trenching, new electrical substations and other infrastructure) to Chumash homelands and cultural resources. BOEM is aware that Morro Rock has special significance to Native Americans with ancestral ties to the area and will continue to engage with the appropriate sovereign entities to better understand any concerns regarding Morro Rock and potential visual disturbances in its vicinity. In addition to the information described in *Historic Properties* above, a three-year BOEM-funded study awarded in August 2021 will support the development of Tribal Cultural Landscapes Assessments that may help inform the NHPA and NEPA reviews after COP submittal.

d) Marine Mammals and Sea Turtles

The information provided below is intended to describe the state of the best available scientific knowledge regarding Endangered Species Act (ESA) listed marine mammal distribution and critical habitat. This information also includes consideration of biologically important areas (BIAs) for all marine mammal species in relation to the Morro Bay Call Area, as well as discussion related to comments received from stakeholders.

Comments received from federal and state agencies, researchers, members of the public and NGOs⁴⁰ that relate to BOEM's selection of the Morro Bay Call Area focused on concerns related to impacts to marine mammal migratory routes and access to BIAs (Figure 10). Comments received from California state agencies also recommend BOEM move forward with including the East Extension in future planning until more information is gathered to understand whether the area will increase the likelihood and magnitude of adverse environmental impacts to sensitive marine species, particularly marine mammals and seabirds which are generally found in higher densities closer to the coast. Specifically, commenters noted that seabirds and elephant seals are more abundant in the East Extension area. BOEM will continue to analyze these issues and work with the state partners and stakeholders before a decision is made to authorize the development of a wind power facility offshore Morro Bay.

Several comments suggested numerous potential mitigation measures to address impacts to marine mammals if offshore wind energy development does occur, such as pre-installation baseline surveys using best available technology and monitoring measures to assess individual species' presence and related biophysical processes that have sufficient temporal and spatial scale and resolution. One commenter suggested the use of real-time dynamic management tools to determine when whales and turtles are or are likely to be present to determine potential curtailment timing.

³⁹ California Offshore Wind Energy Planning Outreach Summary Report, Updated June 2021; <https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Offshore-Wind-Outreach-Addendum.pdf>

⁴⁰ California Offshore Wind Energy Planning Outreach Summary Report, Updated June 2021; <https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Offshore-Wind-Outreach-Addendum.pdf>

BOEM and the state of California worked extensively to gain access to all relevant existing data sources on environmental circumstances and other uses of the OCS in the Call Areas and made that data available through the Data Basin. A broadscale review of these data was conducted to reveal any areas of biological importance, critical habitat and migratory corridors.

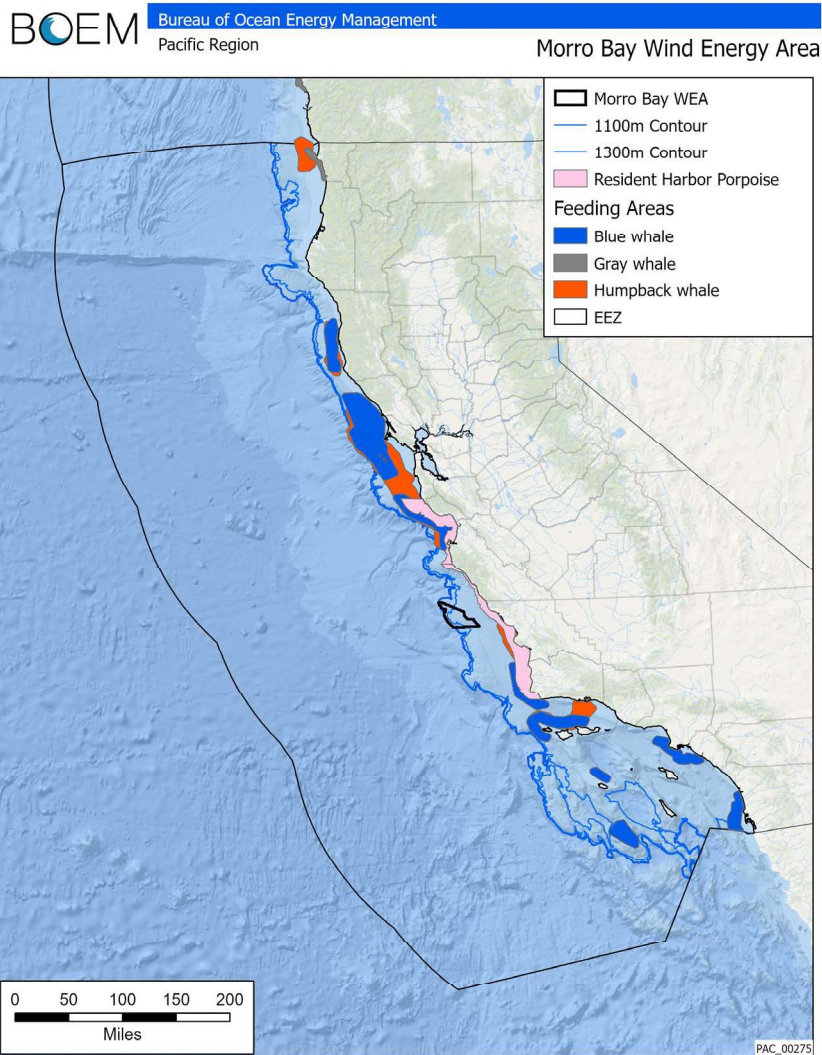


Figure 10: Morro Bay Call Area is outside of Biologically Important Areas (feeding) for blue, humpback, and gray whales, as well as resident areas for harbor porpoise (pink) (Calambokidis et al., 2015)

The following marine species have been documented using migratory corridors or biologically important areas or have critical habitat in proximity to the Morro Bay Call Area. None of these species are expected to occur within the Morro Bay Call Area in sufficient densities to warrant elimination of some or all of the area from further analysis for potential leasing.

- a. North Pacific Right Whales (listed as Endangered under the ESA): Outside of the Bering Sea and Gulf of Alaska, from 1950- 2001, there have been at least four sightings of North Pacific right whales from the eastern population from Washington, twelve from California, three from Hawaii, one from British Columbia, and two from Baja California, Mexico⁴¹. More recently, one North Pacific right whale was seen off La Jolla, CA in April 2017, and a different animal was sighted off the Channel Islands in May 2017. Farther north, there were two sightings off British Columbia in 2013⁴² and one in June 2018.⁴³ Sightings have occurred in Mexican waters and thus there is some evidence that North Pacific right whales travel through California waters to reach Southern California or Mexico in the summer months, though by what route and in what number species utilize this unconfirmed migratory route is unknown.⁴⁴ Critical habitat in the Bering Sea and Gulf of Alaska was designated in 2008 (73 FR 19000). Low numbers of sightings of individuals from a very small population makes any kind of demographic analysis challenging. Current knowledge of the low number of sightings offshore California in the last 68 years (14 sightings from 1950-2018, even with increased survey efforts), and the small population size (approximately 31 individuals), indicates that North Pacific right whales are unlikely to have any significant presence in the Morro Bay Call Area.

- b. Blue Whales (listed as Endangered under the ESA): Although feeding also occurs further to the north and south of the U.S. west coast, it remains an important feeding area for blue whales in the summer and fall⁴⁵. As such, nine biologically important areas have been identified, including three areas in central California⁴⁶. Most of this Eastern North Pacific Stock is thought to migrate south to take advantage of high productivity in the waters of Baja California, the Gulf of California, and the Costa Rica Dome during the winter and spring. The amount of blue whale habitat that overlaps with the Morro Bay Call Area varies according to the data source; however, no blue whale BIAs or core use areas overlap with the Morro Bay Call Area. (Figure 11).

- c. Fin Whales (listed as Endangered under the ESA): Fin whales occur in both pelagic and coastal waters, where they feed primarily on krill and fish. Current research suggests that only some fin whales undergo long distance migrations, with some individuals remaining

⁴¹ Brownell, R.L. Jr, Clapham, P.J., Miyashita, T. & Kasuya, T. 2001. Conservation status of North Pacific right whales. *Journal of Cetacean Research and Management*. 2:269–286.

⁴² Ford, J. K. B., Pilkington, J.F., Gisborne, B., Frasier, T.R., Abernethy, R.M., Ellis, G.M. 2016. Recent observations of critically endangered North Pacific right whales (*Eubalaena japonica*) off the west coast of Canada. *Marine Biodiversity Records* 9:50. DOI: [dx.doi.org/10.1186/s41200-016-0036-3](https://doi.org/10.1186/s41200-016-0036-3)

⁴³ Carretta, J.V., Oleson, E.M., Forney, K.A., Muto, M.M., Weller, D.W., Lang, A.R., Baker, J., Hanson, B., Orr, A.J., Barlow, J., Moore, J.E., Brownell Jr, R.L. 2021. U.S. Pacific Marine Mammal Stock Assessments: 2020, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-646

⁴⁴ Ibid.

⁴⁵ Carretta, J.V., Forney, K.A., Oleson, E.M., Weller, D.W., Lang, A.R., Baker, J., Muto, M.M., Hanson, B., Orr, A.J., Huber, H., Lowry, M.S., Barlow, J., Moore, J.E., Lynch, D., Carswell, L., Brownell Jr, R.L. 2020. U.S. Pacific Marine Mammal Stock Assessments: 2019, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-629

⁴⁶ Calambokidis, J., Steiger, G.H., Curtice, C., Harrison, J., Ferguson, M.C., Becker, E., De Angelis, M, and Van Parijs, S.M. 2015. Biologically Important Areas for Selected Cetaceans Within U.S. Waters – West Coast Region. *Aquatic Mammals (Special Issue)*. 41(1):390653. DOI 10.1578/AM.41.1.2015.39

resident in warmer waters of the Southern California Bight.⁴⁷ ⁴⁸ The variability in movements make BIAs difficult to define and thus none are yet defined.⁴⁹ Satellite-tracked fin whales seemed to favor nearshore habitats along the mainland coast, and in the northern Catalina basin in autumn and winter, and then disperse to the outer waters of the Southern California Bight, offshore and further north in spring and summer.⁵⁰ Habitat suitability models suggest the Morro Bay Call Area falls within suitable fin whale summer and fall habitat (average density of 0.0071-0.700 whales per 10 km²), with lower habitat suitability/occurrence in the spring and winter⁵¹ ⁵².

⁴⁷ Ibid.

⁴⁸ Scales, K.L., Schorr, G.S., Hazen, E.L., Bograd, S.J., Miller, P.I., Andrews, R.D., Zerbini, A.N., Falcone, E.A. 2017. Should I stay or should I go? Modelling year-round habitat suitability and drivers of residency for fin whales in the California Current. *Diversity and Distributions*. 23(10):1204-1215

⁴⁹ Calambokidis, J., Steiger, G.H., Curtice, C., Harrison, J., Ferguson, M.C., Becker, E., De Angelis, M., and Van Parijs, S.M. 2015. Biologically Important Areas for Selected Cetaceans Within U.S. Waters – West Coast Region. *Aquatic Mammals (Special Issue)*. 41(1):390653. DOI 10.1578/AM.41.1.2015.39

⁵⁰ Ibid.

⁵¹ Becker, E., Forney, K.A., Fiedler, P.C., Barlow, J., Chivers, S.J., Edwards, C.A., Moore, A.M., Redfern, J.V. 2016. Remote Sensing of Biodiversity (Special Issue). 8(2): 149; <https://doi.org/10.3390/rs8020149>

⁵² Scales, K.L., Schorr, G.S., Hazen, E.L., Bograd, S.J., Miller, P.I., Andrews, R.D., Zerbini, A.N., Falcone, E.A. 2017. Should I stay or should I go? Modelling year-round habitat suitability and drivers of residency for fin whales in the California Current. *Diversity and Distributions*. 23(10):1204-1215

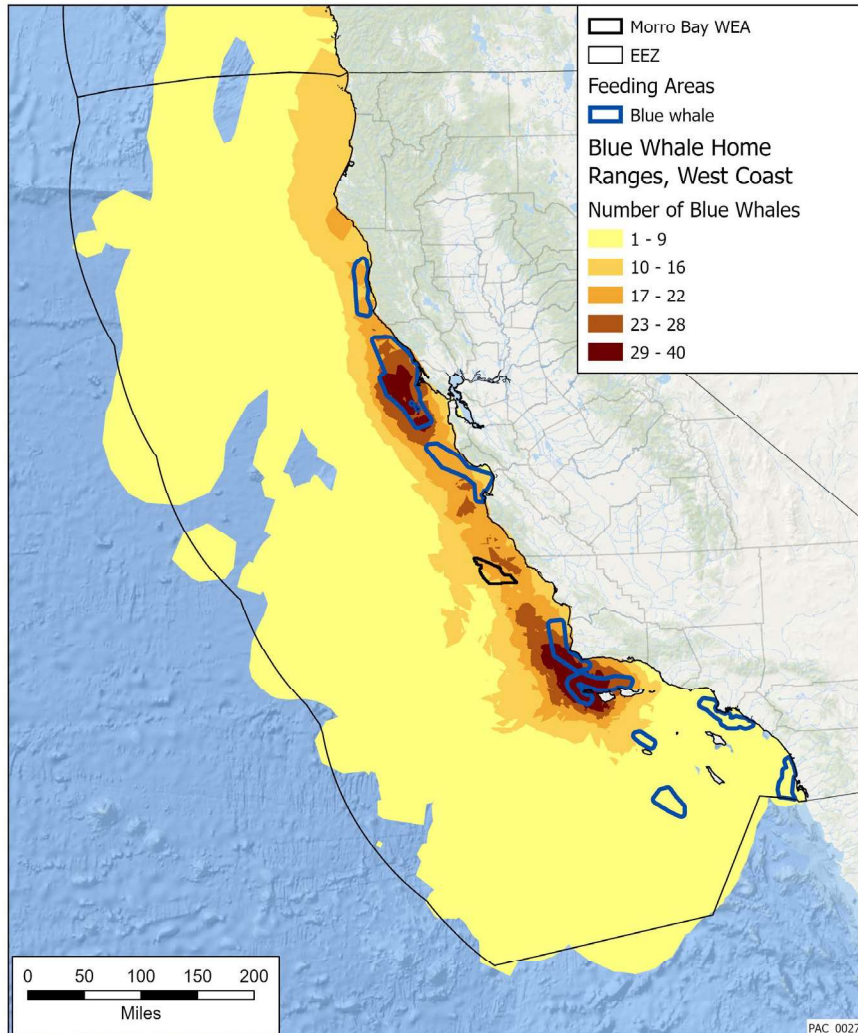


Figure 11: Blue whales may occur in and around the Morro Bay Call Area, however it does not overlap with areas for feeding (blue outline) or core use (dark red; Irvine et al., 2014)

- d. Humpback Whales (listed as Endangered under the ESA): Humpback whales undertake two migrations per year between mostly polar, cold water, feeding grounds in the summer months, and sub-tropical mating and calving grounds in the winter months. During these migrations in the Pacific, concentrations of humpback whales increase with proximity to shore.⁵³ Although the Morro Bay Call Area does not overlap with humpback whale feeding BIAs (Figure 10), critical habitat was designated for the Central America and Mexico Distinct Population Segments (DPS) in April 2021 (86 FR 21082), encompassing much of the West Coast of the U.S. The Morro Bay Call Area comprises

⁵³ Keiper, C.A., Calambokidis, J., Ford, G., Casey, J., Miller, C., Kieckhefer, T.R. 2011. Spatial Distribution Patterns of Humpback and Blue Whales Relative to San Francisco, California Shipping Lanes and Vessel Traffic. Poster. International Marine Conservation Congress.

approximately 0.3% of this critical habitat (Figure 12). NOAA Southwest Fisheries Science Center (SWFSC) density models, which are based on ship-based surveys, predict that humpback whales are likely to occur in the Morro Bay Call Area (0.0006-1 whale per 10 km² or 5-8% of the Central American DPS, or 1% of the entire population)^{54 55} (Figure 12).

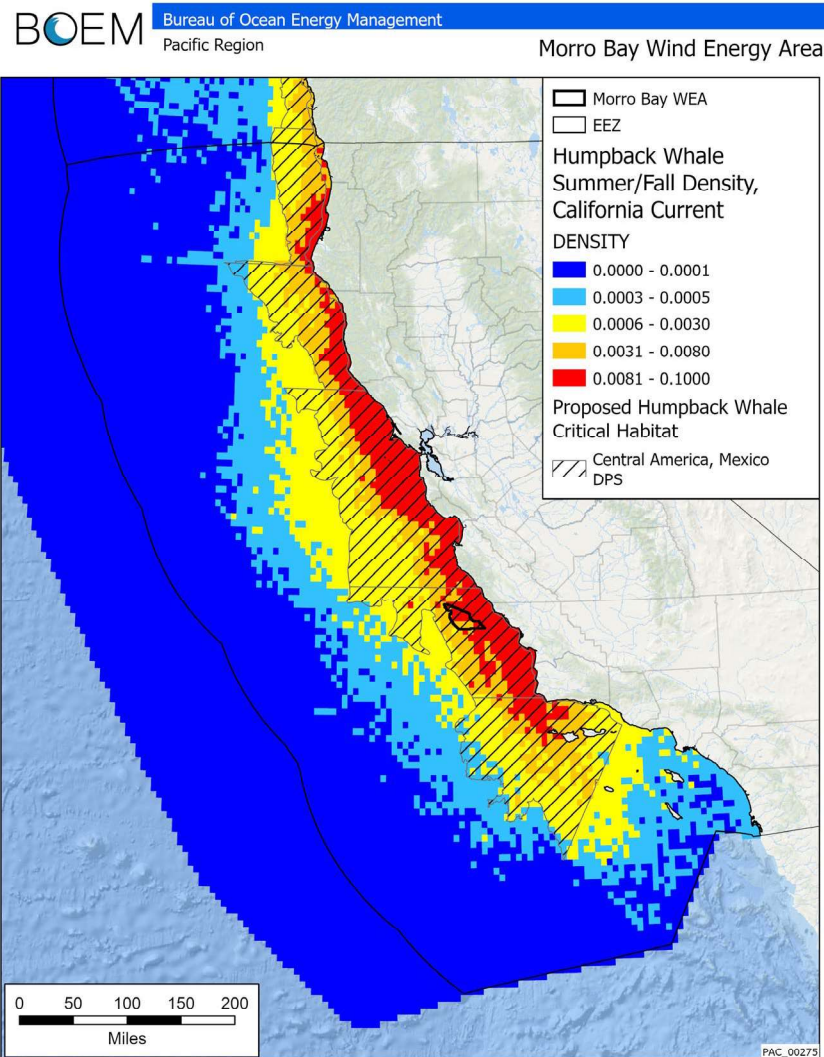


Figure 12: Morro Bay Call Area overlaps with the predicted occurrence of 5-8% of the Central American DPS, or 1% of the entire population of North Pacific humpback whales in summer/fall (Becker et al., 2016), and with 0.3% of feeding critical habitat (86 FR 21082) (hatched area)

⁵⁴ Becker EA, Foley DG, Forney KA, Barlow J, Redfern JV, Gentemann CL. 2012. Forecasting cetacean abundance patterns to enhance management decisions. *Endangered Species Research*. 16, 97–112

⁵⁵ Becker, E., Forney, K.A., Fiedler, P.C., Barlow, J., Chivers, S.J., Edwards, C.A., Moore, A.M., Redfern, J.V. 2016. Remote Sensing of Biodiversity (Special Issue). 8(2): 149; <https://doi.org/10.3390/rs8020149>

- e. Gray Whales (listed as Endangered under the ESA): Gray whale feeding BIAs occur on the OCS and in coastal nearshore waters further north of the Morro Bay Call Area, primarily in Washington and Oregon⁵⁶ (Figure 10). As such, the Call Area does not overlap with gray whale feeding BIAs. Similarly, migratory corridors occur close to shore (within 5.4 nmi) (Figure 13). It is important to note that in defining migratory BIAs, Calambokidis et al. (2015) included a 25.4 nmi buffer for gray whales (see Figure 13). The buffer represents the potential path of some individuals that move farther offshore during annual gray whale migrations.
- f. Harbor Porpoise: Biologically important areas for two harbor porpoise stocks are located in Central and Northern California⁵⁷. The most southern of these is the Morro Bay resident biologically important area (for the Morro Bay Stock) which extends from Point Sur to Point Conception and from land to the 200-m isobath, although the vast majority of harbor porpoise seen in California were recorded within the 0-50 fathom (91 m) depth range.⁵⁸ Genetic analyses have shown that the various stocks are genetically dissimilar and do not interbreed or migrate⁵⁹. The Morro Bay Stock is estimated between 2,737-4,255 animals^{60 61}. The Morro Bay Call Area does not overlap with harbor porpoise habitat (Figure 14).

⁵⁶ Calambokidis, J., Steiger, G.H., Curtice, C., Harrison, J., Ferguson, M.C., Becker, E., De Angelis, M., and Van Parijs, S.M. 2015. Biologically Important Areas for Selected Cetaceans Within U.S. Waters – West Coast Region. *Aquatic Mammals (Special Issue)*. 41(1):390653. DOI 10.1578/AM.41.1.2015.39

⁵⁷ Calambokidis, J., Steiger, G.H., Curtice, C., Harrison, J., Ferguson, M.C., Becker, E., De Angelis, M., and Van Parijs, S.M. 2015. Biologically Important Areas for Selected Cetaceans Within U.S. Waters – West Coast Region. *Aquatic Mammals (Special Issue)*. 41(1):390653. DOI 10.1578/AM.41.1.2015.39

⁵⁸ Barlow, J., Lovier, C.W., Jackson, T.D., Taylor, B.L. 1988. Harbor porpoise, *Phocoena phocoena*, abundance estimation for California, Oregon, and Washington: II. Aerial surveys. *Fishery Bulletin- National Oceanic and Atmospheric Administration*. 86(3):433-444

⁵⁹ Morin, P.A., Forester, B.R., Forney, K.A., Crossman, C.A., Hancock-Hanser, B.L., Robertson, K.M., Barrett-Lennard, L.G., Baird, R.W., Calambokidis, J., Gearin, P., Hanson, M.B., Schumacher, C., Harkins, T., Fontaine, M.C., Taylor, B.L., Parsons, K.M. 2021. Population structure in a continuously distributed coastal marine species, the harbor porpoise, based on microhaplotypes derived from poor-quality samples. *Molecular Ecology*. 00:1-20

⁶⁰ Forney, K.A., J.E. Moore, J. Barlow, J.V. Carretta and S.R. Benson. 2021. A multi-decadal Bayesian trend analysis of harbor porpoise (*Phocoena phocoena*) populations off California relative to past fishery bycatch. *Marine Mammal Science*. 37(2):546-560

⁶¹ Carretta, J.V., Forney, K.A., Oleson, E.M., Weller, D.W., Lang, A.R., Baker, J., Muto, M.M., Hanson, B., Orr, A.J., Huber, H., Lowry, M.S., Barlow, J., Moore, J.E., Lynch, D., Carswell, L., Brownell Jr, R.L. 2020. U.S. Pacific Marine Mammal Stock Assessments: 2019, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-629

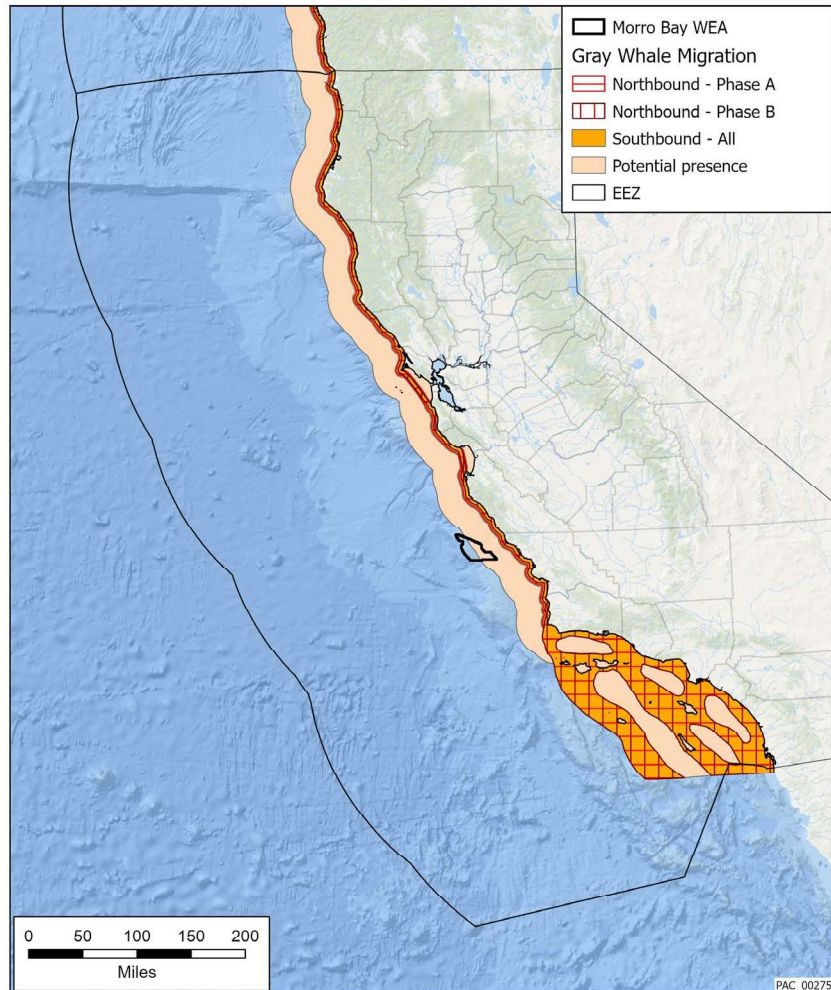


Figure 13: Gray whale migratory corridor with a 25.4 nmi buffer (pink) indicates possible whale presence in the Morro Bay Call Area ((Calambokidis et al., 2015)

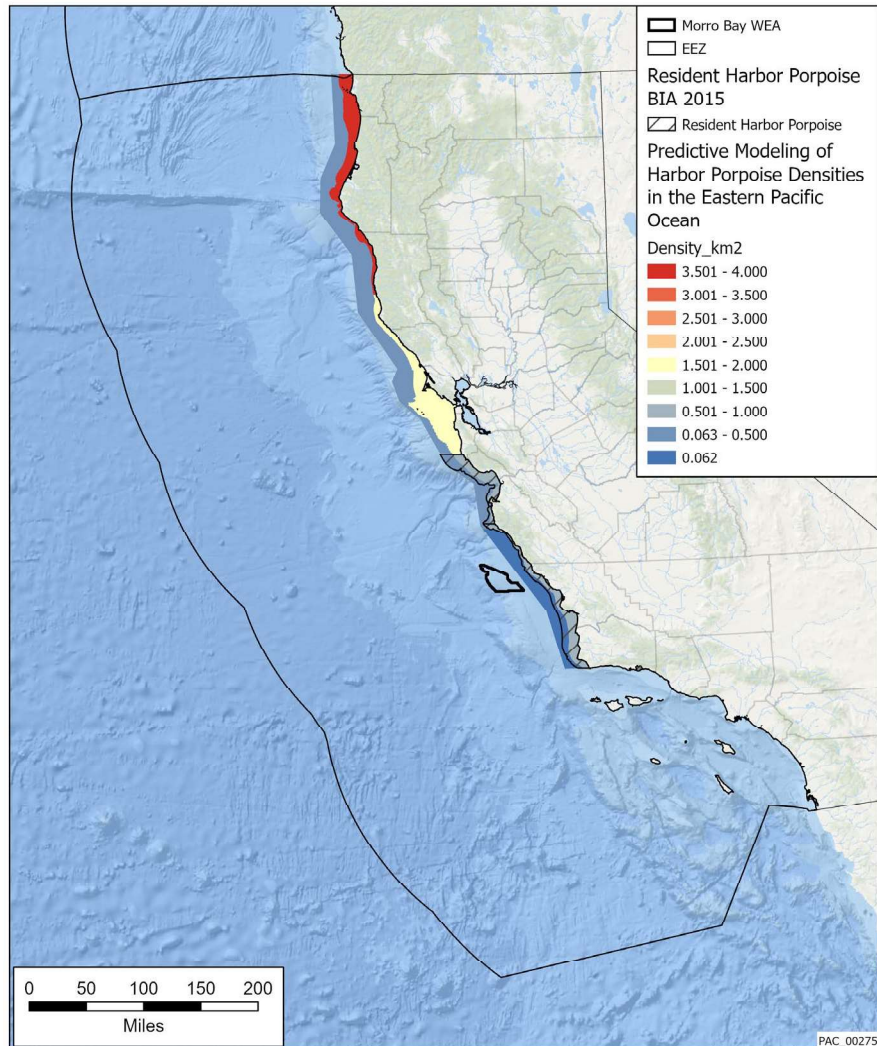


Figure 14: Morro Bay Call Area is offshore of Biological Important Area of harbor porpoise (*Phocoena phocoena*) (hatched area; Calambokidis et al., 2015)

- g. Northern Elephant Seals: These seals breed and give birth, primarily on offshore islands, in California and Baja California (Mexico). Males migrate to the Gulf of Alaska and western Aleutian Islands along the continental shelf to feed on benthic prey species, whereas females migrate to more pelagic areas in the Gulf of Alaska and the central North Pacific to feed on pelagic prey.⁶² Adults remain on land between March and August to molt.⁶³ The Piedras Blancas Rookery is located further north on the San

⁶² Le Boeuf, B. J., Crocker, D. E., Costa, D. P., Blackwell, S. B., Webb, P. M., Houser, D. S. 2000. Foraging ecology of northern elephant seals. *Ecological monographs*, 70(3), 353-382.

⁶³ Carretta, J.V., Oleson, E.M, Weller, D.W., Lang, .R., Forney, K.A., Baker, J., Muto, M.M., Hanson, B., Orr, A.J., Huber, H., Lowry, M.S., Barlow, J., Moore, J.E., Lynch, D., Carswell L., Brownell Jr, R.L. 2015. U.S. Pacific Marine

Simeon shores, where large numbers of seals are seen in January, April and October, and a haul out site is at Santa Rosa Island further to the south. Results of a tagging study suggest that there is potential for Northern elephant seals to occur in small numbers around the Morro Bay Call Area.⁶⁴

- h. Leatherback Sea Turtles (listed as Endangered under the ESA): Leatherback sea turtles have the most extensive range of any living reptile and have been reported circumglobally throughout the oceans of the world.⁶⁵ Migratory routes of leatherbacks are not entirely known. However, turtles tagged after nesting in July at Jamursba-Medi, Indonesia, arrived in waters off California and Oregon during July-August^{66 67} coincident with the development of seasonal aggregations of jellyfish.^{68 69} Other studies similarly have documented leatherback sightings along the Pacific coast of North America during the summer and fall months, when large aggregations of jellyfish form.⁷⁰^{71 72} NMFS published a final rule designating critical habitat for leatherback sea turtles in 2012 (77 FR 4169). This critical habitat contains the main feeding habitat for leatherback sea turtles and stretches along the California coast from Point Arena to Point Arguello east of the 3,000-meter depth contour; and 25,004 square miles (64,760 km²) stretching from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000-meter depth contour. The Morro Bay Call Area does occur within a small portion of feeding critical habitat for leatherback sea turtles, however this area is not anticipated to have high numbers of leatherback sea turtle occurrence (Figure 15).

Mammal Stock Assessments: 2014. U.S. Department of Commerce, NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-549. 414 p <http://dx.doi.org/10.7289/V5/TM-SWFSC-549>

⁶⁴ Maxwell, S., Hazen, E., Bograd, S. et al. 2013. Cumulative human impacts on marine predators. *Nature Communications*. 4:2688. <https://doi.org/10.1038/ncomms3688>

⁶⁵ National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 2020. Endangered Species Act status review of the leatherback turtle (*Dermochelys coriacea*). Report to the National Marine Fisheries Service Office of Protected Resources and U.S. Fish and Wildlife Service

⁶⁶ Benson, S. R., P. H. Dutton, C. Hitipeuw, B. Samber, J. Bakarbesi, and D. Parker. 2007a. Post-nesting migrations of leatherback turtles (*Dermochelys coriacea*) from Jamursba-Medi, Birds Head Peninsula, Indonesia. *Chelonian Conservation and Biology* 6:150–154.

⁶⁷ Benson, S. R., T. Eguchi, D. G. Foley, K. A. Forney, H. Bailey, C. Hitipeuw, B. P. Samber, R. F. Tapilatu, V. Rei, P. Ramohia, J. Pita, and P. H. Dutton. 2011. Large-scale movements and high-use areas of western Pacific leatherback turtles, *Dermochelys coriacea*. *Ecosphere* 2(7):art84. doi:10.1890/ES11-00053.1

⁶⁸ Shenker, J. M. 1984. Scyphomedusae in surface waters near the Oregon coast, May–August, 1981. *Estuarine, Coastal and Shelf Science*. 19:619–632.

⁶⁹ Suchman, C.L. and Brodeur, R.D. 2005. Abundance and distribution of large medusae in surface waters of the Northern California Current. *Deep Sea Research Part II Topical Studies in Oceanography*. 52(1-2):51-72 DOI:10.1016/j.dsr2.2004.09.017

⁷⁰ Bowlby, C.E. 1994. Observations of leatherback turtles offshore of Washington and Oregon. *Northwestern Naturalist*. 75:33-35.

⁷¹ Starbird, C. H., A. Baldrige, and J. T. Harvey. 1993. Seasonal occurrence of leatherback sea turtles (*Dermochelys coriacea*) in the Monterey Bay region, with notes on other sea turtles, 1986-1991. *California Fish and Game* 79(2):54–6

⁷² Benson, S. R., K. A. Forney, J. T. Harvey, J. V. Carretta, and P. H. Dutton. 2007b. Abundance, distribution, and habitat of leatherback turtles (*Dermochelys coriacea*) off California, 1990–2003. *Fishery Bulletin* 105:337–347.

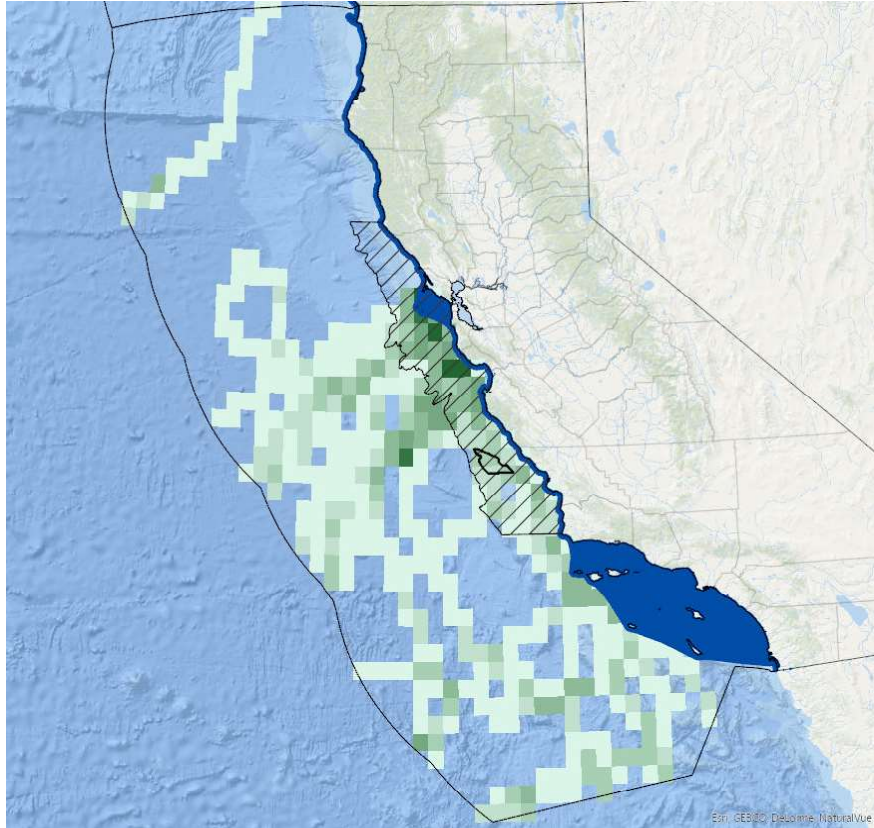


Figure 15: The Morro Bay Call Area overlaps with a small portion of feeding critical habitat (hatched) for leatherback sea turtles. Low numbers of leatherback sea turtles occur in this area (light green; Maxwell et al., 2013). Blue indicates probable occurrence year-round.

The abovementioned information is intended to describe the state of the best available scientific knowledge regarding marine mammal distribution, critical habitat, and BIAs in relation to the Morro Bay Call Area. This information indicates that the Morro Bay Call Area overlaps with relatively small parts of geographically extensive designated feeding critical habitat for humpback whales and leatherback sea turtles, and with an offshore portion of the migratory buffer for the gray whale migratory BIA. Considering the analyses contained herein, these elements by themselves do not warrant reduction of the area to be analyzed for potential leasing.

Potential impacts from offshore wind development can be most completely assessed once BOEM receives a detailed proposal. BOEM also determined that site-specific mitigations to further minimize or avoid potential impacts to marine protected species would be identified at later stages in the development process, including through lease stipulations and terms and conditions of COP approval, as appropriate.⁷³ In a proactive effort to minimize and mitigate any potential impacts from offshore floating wind on marine mammals BOEM is currently supporting studies to: obtain updated marine mammal distribution data using visual and acoustic platforms that incorporate cutting edge technologies; establish a vulnerability index

⁷³ BOEM will further consider vessel speed restrictions in the development of lease stipulations for any future leases awarded in the Call Areas.

for marine mammals and sea turtles in the Pacific; develop a scientifically based and biologically accurate simulator to assess potential entanglement risk from offshore floating wind development. BOEM continues to identify opportunities to support data collection to enhance our abilities to more accurately assess the potential impacts from offshore floating wind development on marine mammal and sea turtle species.

e) *Avian Species*

BOEM's analysis based on our data synthesis and modeling efforts to date, and other sources of information on seabird distribution in the area, found that at least 30 seabird species are present during at least one season in the Morro Bay Call Area at relatively moderate to high densities compared to their entire distributions along the Pacific coast (primarily phalaropes, jaegers, gulls, albatrosses, storm-petrels, and shearwaters). Another approximately 15 species occur in moderate to high relative densities inshore of the Morro Bay Call Area (primarily scoters, grebes, alcids, gulls, terns, loons, cormorants, pelicans) and approximately 9 species occur in moderate to high relative densities farther offshore of the call area (primarily skuas, terns, albatrosses, storm-petrels, petrels). These inshore and offshore species are likely to occur in lower relative densities within the Morro Bay Call Area. Several species that are rare in the vicinity of the call area are listed as endangered or threatened under the Endangered Species Act (ESA) including the Short-tailed Albatross (*Phoebastria albatrus*), Hawaiian Petrel (*Pterodroma sandwichensis*), California Least Tern (*Sterna antillarum browni*), and Marbled Murrelet (*Brachyramphus marmoratus*). In addition, the federally threatened Western Snowy Plover (*Charadrius nivosus nivosus*) occurs on beaches along the San Luis Obispo County coast but is not likely to occur in the Morro Bay Call Area itself.

Avian species-related comments received from the Call focused primarily on concerns related to potential impacts to avian species from the construction and operation of a wind energy project within the call area. However, BOEM did receive several comments that were specific to the Morro Bay Call Area. Several commenters raised concerns about the Morro Bay Call Area East Extension, which overlaps the National Audubon Society-designated Piedras Blancas, CA Important Bird Area, and recommended its removal from further consideration due to the large numbers of Sooty Shearwaters and other species that use this area. There were also comments recommending that BOEM give full consideration to ESA-listed and other species of concern that may be at risk to collisions with turbines. It was also recommended that BOEM evaluate the potential impacts on trans-Pacific migratory birds as part of offshore wind energy planning in Morro Bay. Several commenters were concerned that baseline data on seabird populations in the Call Area was not at a sufficient enough resolution to design efficient and effective development and mitigation plans to minimize negative impacts on seabirds. One commenter identified impacts to bats as a concern and recommended that BOEM and its partner agencies support research to fill knowledge gaps and better understand bat use of the Pacific OCS and within the Morro Bay 399 Area.

BOEM is conducting and planning several studies that will be valuable in understanding avian resources within the Morro Bay Call Area. For example, BOEM just completed its collaboration with the National Oceanic and Atmospheric Administration (NOAA) and U.S. Geological Survey (USGS) on a data synthesis and predictive modeling study of seabird distribution off the entire west coast out to the exclusive economic zone (EEZ) boundary.

BOEM is also collaborating with USGS on several seabird and bat studies including: 1) synthesizing telemetry data on a number of seabird species in the California Current System, including shearwaters; 2) conducting high resolution digital aerial surveys from the Monterey Bay Marine Sanctuary to the Mexican Border, which includes directed efforts to detect migratory movements off the central coast; 3) conducting a systematic study of offshore acoustic bat activity along and offshore the California coast to determine the temporal and spatial distribution of bats, which will help BOEM evaluate the effects of proposed offshore wind energy development on them; 4) tracking southbound Black Brant migration from their breeding grounds in Alaska and northbound migration from wintering areas in California to determine if their migratory movements overlap with Call Areas off the Pacific coast; and 5) planning is underway for establishing a Motus network in the southern California Bight to develop offshore tracking methodologies for bats and small vulnerable seabirds. If the latter effort is successful, networked Very High Frequency tracking could be scaled up to include other areas along the Pacific Coast including the Morro Bay Call Area. In addition, the lessee would conduct site-specific avian surveys to describe the key species and habitat that may be affected by the proposed construction and operations prior to approval of any construction. BOEM will consult with the U.S. Fish and Wildlife Service on potential effects to ESA-listed species through section 7 of the ESA and will also coordinate with them and other agencies and avian stakeholders on potential effects to other species of concern. Further, it is worth noting that many avian and bat mitigation measures and best management practices have been successfully employed across the offshore wind industry and incorporated into plan approvals.

BOEM acknowledges the potential for avian impacts during project construction and operation but believes that the Morro Bay Call Area warrants further consideration while BOEM is conducting studies and processing data that would be valuable to a deeper understanding of birds and bats within the vicinity. Based on this information, and the information we have evaluated from public comments, BOEM has determined that impacts to seabirds could be addressed on a site-specific basis at the COP review stage but impacts may potentially be reduced if the Eastern Extension was removed from the WEA designation.

f) Cables and other Infrastructure

The presence of in-service submarine cables within the Call Areas may increase future technical challenges to offshore wind energy development. Therefore, BOEM designed the Call Areas and Extensions to limit the presence of subsea cables to reduce the risks to both potential wind energy facilities and existing infrastructure. In addition, early communication and outreach to the owners of existing infrastructure to address any technical challenges may reduce future risk factors.⁷⁴

B. Public Comment Discussion

Among the public comments received on the 2021 Call were recommendations for the acquisition of new data and other research to assist BOEM in its renewable energy leasing

⁷⁴ As referenced in BOEM's Construction Operation Plan Guidance-Attachment H: *Coordination Efforts Relating to Existing Telecommunications Cables* <https://www.boem.gov/COP-Guidelines/>

process. In addition to providing information on the status of fisheries in the vicinity of the Call Area and extensions, the PFMC recommended that BOEM do further research or modeling on oceanographic and physiographic changes that may be attributed to large scale offshore wind development. The PFMC also recommended that BOEM acquire updated high-resolution seafloor mapping data for the entire area. Similarly, in a comment received from California, agencies recommended further seafloor and benthic habitat characterization through the Call Area and extensions. These comments will be considered for potential use in the upcoming environmental analysis for potential lease issuance, for future analyses related to any project implementation, or for consideration in BOEM's environmental studies program, as appropriate.

In a very detailed comment letter co-signed by ten NGOs that focus on environmental protection, a large number of specific recommendations were included for further BOEM consideration. Although many are considered by BOEM to be most appropriately addressed during analysis of potential project construction and operation, such as consideration of different turbine technologies and their interface with the environment, the environmental organizations also provided concrete examples of potential impacts to resources that should be considered in BOEM's analyses. Some of these resource issues are discussed below, particularly as they relate to fish, birds, or marine mammals, and how these considerations influence the recommendation for the determination of the WEA in this memorandum. Other recommendations in the letter, such as requests for further data acquisition relating to the seafloor, the benthic environment, corals, and other resources, are noted and will be incorporated into future analysis where appropriate.

VII. WEA Recommendation

A. Introduction

In recommending the Morro Bay WEA, BOEM is advancing the Biden Harris Administration's goal to achieve 30 GW of offshore wind by 2030 and net zero emissions by 2050, and is responsive to California's renewable energy goals, increase the potential for competition in future offshore wind energy solicitations, and develop a predictable leasing process. BOEM's WEA recommendation is a result of balancing key existing interests, primarily those of military mission compatibility, coastal resources in California, state renewable energy goals, and anticipated future uses based on the best available information. Areas offered for lease will be identified in a PSN, as discussed in Section IV. BOEM will consider, in its final leasing decision, the results of the NEPA analysis and associated consultations, as well as relevant new information that it receives between its WEA designation and issuance of the FSN. Additionally, BOEM maintains its flexibility to offer only a portion of the WEAs for lease, leaving unselected areas for future consideration. This section discusses the rationale for the recommendation of the WEA and, where appropriate, the exclusion of portions of the Call Area that BOEM is not designating for leasing consideration at this time.

B. Morro Bay WEA Options

In determining the initial Call Areas offshore California, BOEM used data and information on Data Basin which indicate that conflicts with existing ocean uses and avian and marine mammal species increase with proximity to shore. There is a correlation between potential impacts and proximity to shore for commercial and recreational fishing activities (especially high-value fishing activities, such as crabbing); gray and humpback whale migration corridors, which are closer to shore during parts of the year; shorebirds, which exist in higher numbers nearshore; and viewshed impacts, which are more pronounced the closer to shore. This is especially relevant because California's coastal geography typically has large variabilities in elevation along the coastline (i.e., oceanside cliffs). BOEM notes these concerns and will continue to consider them in upcoming stages of the process.

BOEM acknowledges that offshore wind activities in portions of the Morro Bay WEA Options could result in conflicts with other uses of the area. While conflicts may exist, the WEA appears to have lesser conflict than other potential areas that could support offshore wind energy development in California. The Morro Bay WEA Options were delineated by balancing several factors as described below.

1. National Security and Department of Defense Activities

Significant efforts were spent by the DoD, BOEM, the State of California and others to address concerns related to national security, military testing and training activities in the vicinity of Morro Bay, California. On May 25, 2021, the Departments of the Interior and Defense and the State of California announced identification of an area, known as the 'Morro Bay 399 Area' that will support 3 gigawatts of offshore wind on roughly 399 square miles off California's central coast within and adjacent to the Morro Bay Call Area. The Morro Bay WEA Options are located within the Morro Bay 399 Area.

2. Fishing

Fishing activities are broadly considered during the Area ID process to ensure that major conflicts are identified and addressed to the extent practicable. In establishing the Call Areas, BOEM used data described in Section VI.A.1 of this document, which indicates that fishing in California is relatively higher in close proximity to shore, with fisheries usage decreasing towards the west. The options for the WEA include keeping the entire Eastern Extension or removing the Eastern Extension to include areas no closer than 20 miles from shore, avoiding the heaviest fishing areas off the coast.

Further outreach and consideration of fishing issues will continue throughout the several phases of the BOEM process to address comments received during the Calls. For example, PFMC commented that the East Extension overlaps with deep water groundfish fishing grounds and the East Extension area has been historically important for trawl harvest of dover sole and sablefish and is currently an important area for fixed gear sablefish harvest. However, PFMC also indicated that while it could change in the future, currently there is no large-scale market for groundfish trawl vessels. BOEM received input on potential data sources and will pursue those and continue outreach to the fishing industry to obtain the best available data on fishing to inform the next phases of the environmental review and leasing

process. BOEM understands that the placement and development of wind turbines could impact certain types of commercial fishing. BOEM will continue to outreach with the fishing community and study the exact types of fishing and areas that are of most concern and work with industry, state, and the fishing community to mitigate these concerns to the extent practicable. Based in part on current existing fishing data, when developing the Morro Bay Call Area, BOEM did not pursue areas closer than 17 miles from shore where higher fisheries usage and higher economic value is present.

3. Vessel Navigation

BOEM recognizes that the proximity of the WEA Options to the Recommended Tracks within Monterey Bay National Marine Sanctuary presents a concern to mariners in this region, particularly to vessels that may be experiencing mechanical or technical difficulties and require additional room to maneuver. As described in the navigation section above, BOEM considered the existing traffic patterns in the region through analysis of AIS trackline data. In addition, the USCG is conducting the PACPARS process to investigate potential navigational measures, such as extension of the existing traffic separation scheme (TSS) in the Santa Barbara Channel, and other potential future routing measures. BOEM recognizes that the PACPARS is in the early stages of a lengthy process and the outcome of that process may influence future decisions in this area (e.g., leasing, COP approval). For the purposes of this effort, BOEM is working closely with the USCG and stakeholders and believes that there is space offshore California to safely accommodate both offshore renewable energy and maritime traffic aspirations. Given this uncertainty, BOEM has decided to include areas with potential overlap with vessel traffic, for further consideration and will continue to work with the USCG in the planning process to identify an outcome that provides for both navigation safety and opportunities for offshore wind development

4. Viewshed

It is clear that potential visual impacts are more pronounced closer to shore, and as described elsewhere in this memorandum, this was a contributing factor to development of the Call Area. Visual impacts depend on project specifics, such as wind turbine number, size, spacing, and configuration. As such, visual simulations are most helpful when those details are known. Potential visual impacts would be fully analyzed in coordination with the California agency partners if a lease(s) is issued and a COP(s) is submitted.

5. Marine Mammals and Sea Turtles

For the purposes of area identification, BOEM paid particular attention to areas of biological importance, critical habitat, and migratory corridors. Our analysis showed that the Morro Bay Call Area overlaps with relatively small parts of these areas for a few species. In addition, marine mammals and sea turtles are not expected to be within the Morro Bay Call Area in significant numbers. These results, together with BOEM's current and planned studies, suggest that the exclusion of some or all of the area from further analysis for potential leasing is not warranted based on this factor alone. Once a detailed proposal is submitted, BOEM will undertake finer scale analyses and identify applicable mitigation measures, as necessary, to further reduce any potential risks to marine mammal and sea turtle species.

6. *Birds and Bats*

Based on the status of current and planned studies, there is no indication that birds or bats are found in the vicinity of the Morro Bay Call Area in a manner that warrant the exclusion of some or all of the area from further analysis for potential leasing, at this stage. Nevertheless, in light of the comments received, BOEM acknowledges that removing the East extension could potentially provide some benefit to species such as Sooty Shearwater. BOEM is conducting studies and processing data that would be valuable to enhanced understanding of how birds and bats might be impacted by future offshore construction and operations, and which will be used to inform decisions in later steps of BOEM's process.

Wind Energy Area Development

7. *Changes from 2018 Morro Bay Call Area*

BOEM and California state agencies gathered data and information along the entire California coast beginning in 2017 with a special emphasis on areas off Central California because of commercial interest, existing transmission infrastructure, and wind energy resources. Informed by those efforts, BOEM identified the Morro Bay Call Area in 2018. The 2018 Morro Bay Call Area was substantially winnowed down based on the above factors, primarily national security interests. The 2018 Morro Bay Call Area consisted of an area 20 mi offshore the California coast, about 27 miles in length from north to south and about 27 mi in width from east to west, totaling 199,266 acres (311 square mi). BOEM decided to remove from the WEA recommendation a north portion of the 2018 Morro Bay Call Area consisting of 33,804 acres (53 square mi) that conflicts with national security and military training and testing activities. The remaining portion of the 2018 Morro Bay Call Area consisting of 165,462 acres (259 square mi) is retained with the 2021 Call East and West Extensions under the following 2 WEA options.

Option 1 - Inclusion of the 2021 Call, East and West Extensions with the remainder of the 2018 Call Area in the WEA

The Option 1 WEA as described in Table 1 and depicted in Figure 1a, includes the West and East Extension and consists of approximately 255,487 total acres (399 square miles) and provide up to 3.1 GW of electricity. BOEM acknowledges concerns received including potential impacts to commercial fishing activities and viewshed of areas closer to shore. These and other relevant factors will be analyzed in the next steps of the process prior to determining lease areas and approving a wind energy project on a lease.

Option 2 - Inclusion of the 2021 Call West Extension with the remainder of the 2018 Call Area in the WEA

The Option 2 WEA as described in Table 1 and depicted in Table 1 and Figure 1b, includes only the West Extension and consists of approximately 240,898 total acres (376 square miles) and could provide about 2.9 GW electricity. The choice to exclude the East Extension is based on the stakeholder identification of various resource conditions or use conflicts, primarily including


Tribal concerns and potential commercial fishing, avian and visual impacts.

While further outreach, data gathering, and analysis could provide BOEM with a more comprehensive understanding of the uses in the East Extension that could support leasing this area in the future, there are several factors that support the removal of the East Extension at this time. This option takes into consideration, comments received during BOEM’s outreach and in response to the 2021 Call indicate that the East Extension is of particular concern to the fishing industry because of increase in fishing activity as you move closer to shore. The PFMC also recommended that historic production from trawl vessels should be considered as a placeholder for future fisheries impacts as this area was historically important for trawl harvest of dover sole and sablefish. PFMC also indicated that the area is important for fixed gear sablefish harvest.

Visual impacts depend on project specifics, such as wind turbine number, size, spacing, and configuration, and, as such, it is more appropriate to conduct visual simulations when those details are known and potential mitigation measures, such as paint colors and aircraft detection lighting systems, would be fully analyzed in coordination with the California agency partners if a lease(s) is issued and a COP(s) is submitted. However, California state agencies stated in their comments the East Extension is potentially inconsistent with local scenic resource policies. In addition, alteration of the viewshed for Morro Rock and Hearst Castle would also increase closer to shore.

VIII. Director Concurrence

- Option 1 – Inclusion of 2021 Call Area, East and West Extension
- Option 2 – Inclusion of 2021 Call Area and West Extension



Amanda Lefton
Director, Bureau of Ocean Energy Management

11/12/21

Date

APPENDIX B

Current and Reasonably Foreseeable Planned Actions

1. Introduction

This appendix discusses ongoing and reasonably foreseeable planned actions that could occur in the same location and/or timeframe as the Proposed Action discussed in the Morro Bay Environmental Assessment (EA). The Proposed Action is issuance of commercial wind energy leases within the Morro Bay Wind Energy Area (WEA) that the Bureau of Ocean Energy Management (BOEM) has designated on the Outer Continental Shelf (OCS) in northern California. The Morro Bay WEA is defined as an offshore area extending generally 20 miles (mi) offshore to the north of the city of Morro Bay and is approximately 240,898 total acres ((ac), 376 square miles (mi²)) in size. Water depths across the WEA range from approximately 900–1,300 meters (m) 2,953–4,265 feet (ft)). Planned actions could include areas between the WEA and onshore for cable corridors and substation facilities. Those areas would later be granted to a lease holder as rights-of-way (ROWs) and/or rights-of-use and easement (RUEs) in support of wind energy development.

BOEM considered ongoing and reasonably foreseeable planned actions that would occur offshore central California, as well as activities that would take place in state waters (Figure 1). However, the geographic boundaries for activities that could interact with marine mammals, sea turtles, fishes, fishing, and birds is beyond this area due to the extensive migration patterns of many species. This section addresses ongoing and planned actions that overlap with this regional area and may occur between the start of Proposed Action activities in 2023 and the completion of decommissioning of meteorological buoys in 2028, depending on when the leases are issued.

Critical offshore infrastructure in the vicinity of the Morro Bay WEA is shown in Figure 1. Relevant coastal anthropogenic features identified by BOEM while preparing the Morro Bay EA include submarine telecommunication cables, oil & gas platforms and pipelines, and proposed wind energy areas in California State Waters near Vandenberg Space Force Base. The Morro Bay WEA is bordered in the east by the Monterey Bay National Marine Sanctuary. Additionally, the proposed Chumash Heritage National Marine Sanctuary, if officially designated a marine sanctuary in the future by the National Ocean and Atmospheric Agency (NOAA), would bound the Morro Bay WEA in the southeast. Geospatial data for these coastal features were compiled from the NOAA Marine Cadastre web portal, and the BOEM and California State Lands Commission websites.

2. Ongoing and Reasonably Foreseeable Planned Actions

Ongoing and reasonably foreseeable planned actions over the same geography and/or timescale include eight types of actions: (1) other renewable energy development activities; (2) military use; (3) marine transportation; (4) fisheries use and management; (5) National Marine Sanctuary planning and management; (6) scientific surveys; and (7) undersea transmission lines and telecommunications cables.

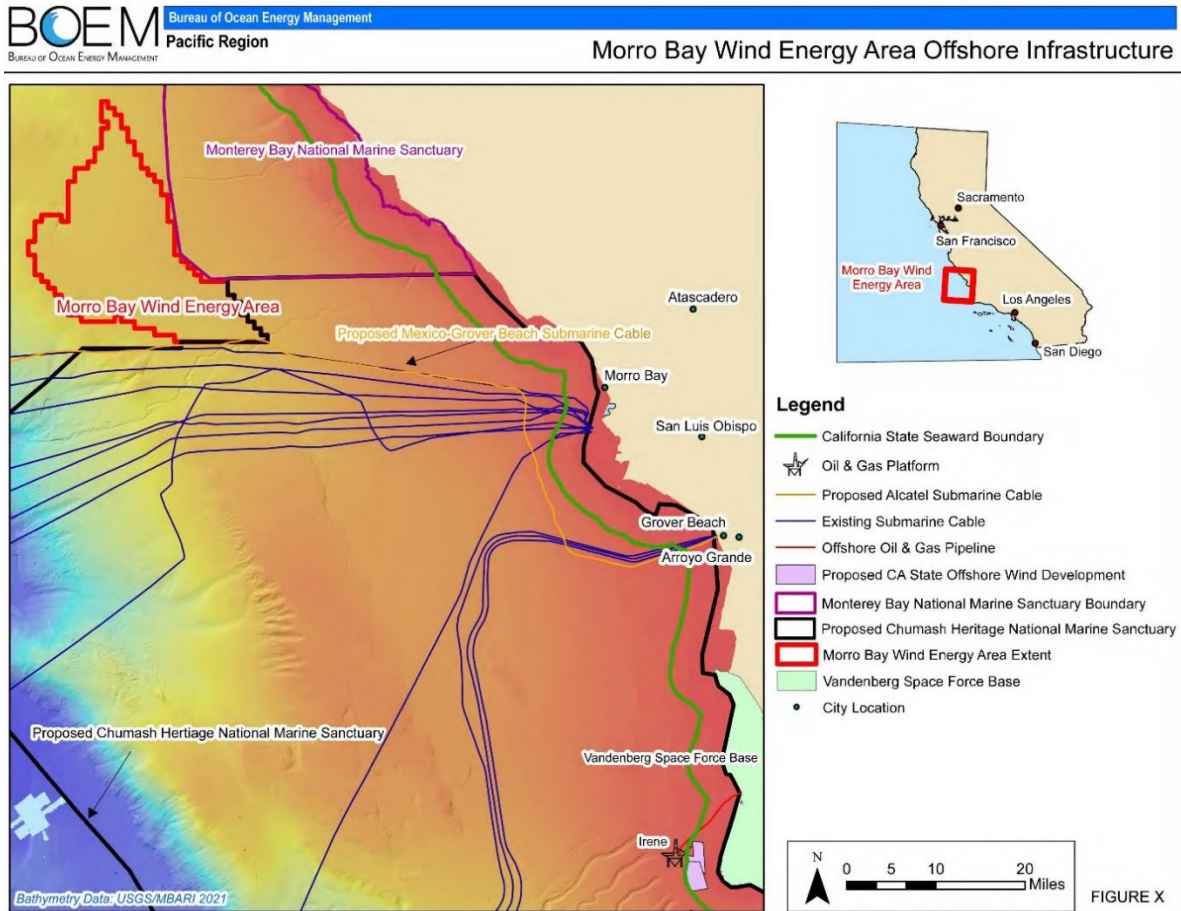


Figure 1: Map of Reasonably Foreseeable Planned Actions in Relation to the Morro Bay Wind Energy Area Offshore Central California

2.1 Other Renewable Energy Development Activities

These activities would include site characterization surveys and site assessment activities similar to the Proposed Action.

The California State Lands Commission is gathering information for two lease applications for offshore floating wind energy projects in California State waters both located offshore the Vandenberg Air Force Base. The two Project Applicants are CADEMO Corporation (CADEMO), a renewable energy development company, and IDEOL USA Inc. (IDEOL), a floating offshore wind technology company and project developer. CADEMO proposes to install and operate four offshore floating wind turbines. CADEMO proposes to examine the performance of two distinct floating foundation platforms (barge and tension-leg). Each wind turbine would be capable of producing 12 to 15 megawatts (MW) of renewable electricity. A combined maximum of 60 MW could be generated from the proposed four wind turbines, which would be connected in a series with electrical inter-array cables. The precise lease area and activities would be evaluated further by the State as part of a State Environmental Impact Report process (California State Lands Commission 2021).

BOEM is concurrently writing an Environmental Assessment for the Humboldt Wind Energy Area offshore northern California, which is to the north of the Proposed Action. If a Finding of No Significant

Impact is issued and if leases are offered in 2022, site assessment and characterization activities would be going on currently with the Proposed Action.

2.2 Marine Transportation

Over the timeframe assessed in the Morro Bay EA of five years, BOEM assumes that shipping and marine transportation activities would increase above the present level. However, due to the 2016 expansion of the Panama Canal, shifts and possibly decreases may also occur in freight transport from Asia to large United States (US) ports along the west coast (Park et al. 2020). The expanded Panama Canal allows larger vessels from Asia to travel directly to the ports along the Atlantic Ocean and bypassing the prior route of US West Coast Ports in route to eastern US cities.

The US Coast Guard is conducting a Port Access Route Study (PARS) to evaluate safe access routes for the movement of vessel traffic proceeding to or from ports or places along the western seaboard of the United States and to determine whether a Shipping Safety Fairway and/or routing measures should be established, adjusted or modified. The PARS will evaluate the continued applicability of, and the need for modifications to, current vessel routing measures. Data gathered during this Pacific Coast PARS may result in the establishment of one or more new vessel routing measures, modification of existing routing measures, or disestablishment of existing routing measures off the Pacific Coast between Washington and California and overlaps with the Project Area. This process will take several years. The US Coast Guard collected public comment through January 25, 2022, through a Federal Register (FR) notice published on July 29, 2021 (86 FR 40791).

2.3 Fisheries Use and Management

The Proposed Action overlaps with the Pacific Fishery Management Council's (PFMC) jurisdiction. The PFMC is responsible for making recommendations for federal fisheries management measures to NMFS for implementation. NMFS also creates and implements some fisheries management measures as part of U.S. obligations under various international fishery agreements. The Council manages fisheries for salmon, groundfish, coastal pelagic species (sardines, anchovies, and mackerel), and highly migratory species (tunas, sharks, and swordfish) from three to 200 miles off the coasts of Washington, Oregon, and California (pcouncil.org). The Council works with the International Pacific Halibut Commission to manage Pacific halibut fisheries. The Council's Fishery Ecosystem Plan helps incorporate ecosystem issues into the Council's fishery management plans. The fishery management plans of the Council were established, in part, to manage fisheries to avoid overfishing, which is accomplished through an array of management measures, including annual catch quotas, minimum size limits, and closed areas. The Council is required to achieve optimum yield for public trust marine resources and safeguarding these resources, their habitats, and the fishing communities that rely on their harvest.

The Morro Bay WEA overlaps roughly 50 percent with the Big Sur Coast/Port San Luis Essential Fish Habitat Conservation Areas (EFHCA; NOAA 2020; PFMC 2020). EFHCAs (Figure 2) are spatially discrete areas closed to bottom trawling and, in some cases, other types of bottom contact gear, to protect the important habitat features. The Big Sur Coast/Port San Luis EFHCAs extends from Santa Lucia Bank to Monterey Bay Canyon and encompasses an expansive and geologically complicated region of contiguous rock, mixed substrates, submarine canyons, rocky banks, and steep slope terrain. Further bottom closure areas exist to the western boundary of the Morro Bay WEA while a trawl Rockfish Conservation Area inshore of the Morro Bay WEA was opened to fishing.

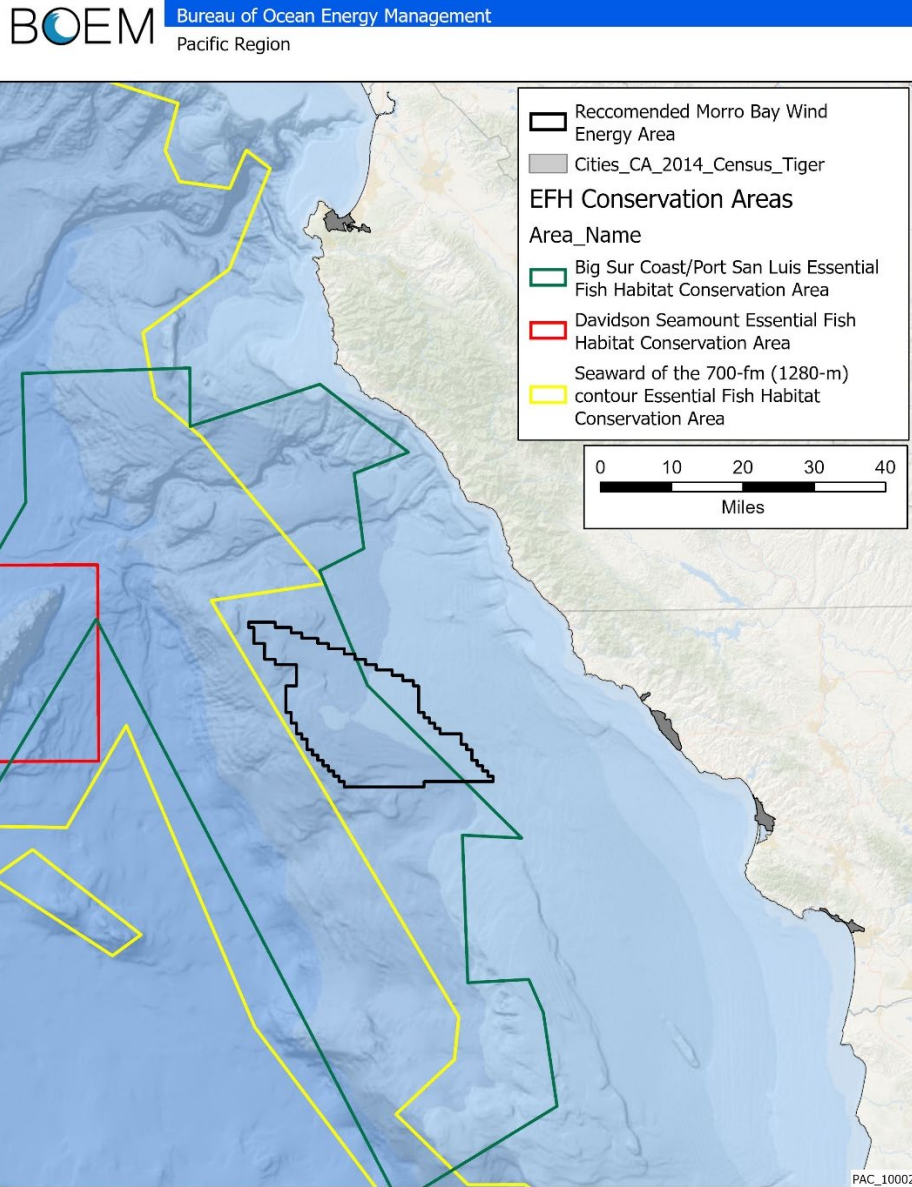


Figure 2: Essential Fish Habitat Conservation Areas

The Council created an Ad Hoc Marine Planning Committee (Committee) in the summer of 2021 to discuss and develop policy Council considerations regarding offshore wind energy and aquaculture activities along the US West Coast. BOEM notes that the Committee recommends coast wide cumulative effects analysis of all wind energy proposed areas (taking into consideration all areas closed to fishing) on all commercial and recreational fisheries, fishing communities, and impacts to domestic seafood production (including port-based fishery-specific facilities and related services. BOEM anticipates, and is planning for, future coordination with the Committee and Council on this (and other) recommendations concurrent with the EA development and into the foreseeable future.

National Oceanic and Atmospheric Administration (NOAA) Fisheries uses stock assessments to monitor the condition of nearly 500 fish stocks. Fishery managers use the results of stock assessments to evaluate the status of fish stocks and set the amounts of fish that commercial and recreational fisheries

can sustainably harvest from a stock in one year. Stock assessments of fish on the west coast region involve both the Northwest and Southwest Fisheries Science Centers within the NOAA. These Centers collect data to inform the stock assessments from at-sea surveys every year. In Fiscal Year 2021 the Centers completed 5 surveys (NOAA Fisheries 2022).

See Section 4.3.3 of the Morro Bay EA for consultation descriptions with the National Marine Fisheries Service.

2.4 National Marine Sanctuary Planning and Management

The National Oceanic and Atmospheric Administration (NOAA) is initiating a process to consider designating a portion of waters along and offshore of the central coast of California as a national marine sanctuary that encompasses approximately 7,000 MI². NOAA is initiating this process based on the area's qualities and boundaries described in the 2015 nomination and excluding any geographical overlap of the boundaries proposed for the Morro Bay 399 Area, as described in the November 10, 2021 Federal Register notice (86 FR 62512 and <https://sanctuaries.noaa.gov/chumash-heritage>). The purpose and need for the designation is to fulfill the purposes and policies outlined in the National Marine Sanctuary Act, which includes identifying and designating as national marine sanctuaries areas of the marine environment which are of special national significance; providing authority for comprehensive and coordinated conservation and management of these marine areas; and protecting the resources of these areas.

2.5 Scientific Surveys and Buoys

Several agencies and non-governmental groups participate voluntarily in the Expanding Pacific Research and Exploration of Submerged Systems to fulfill their individual missions related to earthquake science, fisheries management, and informing conservation and energy development decisions offshore the US West Coast. The NOAA, US Geological Survey, and Monterey Bay Aquarium of Research Institute led several survey efforts to collect bathymetry, high-resolution geophysical data, biological, and sediment core samples between 2017 and 2021 of the Morro Bay WEA (Walton et al. 2021, Cochrane et al. 2022). No surveys are planned for the future.

Central and Northern California Ocean Observing System (CeNCOOS) is a US Government-accredited, regional source for high-quality data, integrated information, and diverse expertise to inform wise and sustainable use of the ocean off central and northern California (cencoos.org). CeNCOOS maintains and publishes long-term oceanographic datasets from the California/Oregon border south to Point Conception. In central California, California Polytechnic State University operates nearshore ocean observing stations coupled with High-Frequency Radar and Harmful Algal Bloom Measurements. Glider deployments regularly transect to the north offshore from Monterey Bay. Water quality stations near Morro Bay use Sea Bird data loggers and sensors to measure temperature, conductivity, pressure (depth/tidal height), fluorescence, turbidity, and dissolved oxygen. A meteorological station measures standard parameters such as wind speed/direction, relative humidity, air temperature, pressure, and shortwave (solar) radiation.

Buoys are currently deployed near the Proposed Action area with historical datasets and current conditions available at NOAA's National Data Buoy Center (<https://www.ndbc.noaa.gov>). Buoy 46028 is the closest to the Morro Bay WEA and is anchored 55 nautical miles northwest of Morro Bay.

2.6 Undersea Transmission Lines and Telecommunication Cables

Submarine cables include fiber-optic cables and trans-Pacific cables exist with landings to the south of the Morro Bay WEA (Figure 1). Please note the cables in Figure 1 come from NOAA dated 2018. Cables have been removed since that time and the Joint Cable Commission confirmed that this map shows additional cables that are no longer present. There is a new cable that is being proposed and would extend along the southern border of the Morro Bay WEA.

3. References

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APPENDIX C
Section 106
Programmatic Agreement

PROGRAMMATIC AGREEMENT

Among

**The U.S. Department of the Interior, Bureau of Ocean Energy Management,
The State Historic Preservation Officer of California,
The Advisory Council on Historic Preservation**

**Regarding Review of Outer Continental Shelf Renewable Energy Activities
Offshore California**

Under Section 106 of the National Historic Preservation Act

WHEREAS, the Outer Continental Shelf Lands Act grants the Secretary of the Interior (Secretary) the authority to issue leases, easements, or rights-of-way on the Outer Continental Shelf (OCS) for the purpose of renewable energy development, including wind energy development (*see* 43 U.S.C. §1337(p)(1)(C)), and to promulgate regulations to carry out this authority (*see* 43 U.S.C. §1337(p)(8)); and,

WHEREAS, the Secretary delegated this authority to the former Minerals Management Service, now the Bureau of Ocean Energy Management (BOEM), and promulgated final regulations implementing this authority at 30 CFR part 585; and,

WHEREAS, under the renewable energy regulations, the issuance of leases and subsequent approval of wind energy development on the OCS is a staged decision-making process that occurs in distinct phases; and,

WHEREAS, OCS means all submerged lands lying seaward and outside of the area of lands beneath navigable waters, as defined in Section 2 of the Submerged Lands Act (43 U.S.C. § 1301), whose subsoil and seabed appertain to the United States and are subject to its jurisdiction and control (*see* 30 CFR § 585.112); and,

WHEREAS, BOEM may issue commercial leases, limited leases, research leases, Right-of-Way (ROW) grants, or Right-of-Use and easement (RUE) grants on the OCS (*see* Appendix); and,

WHEREAS, Commercial leases, Limited leases, ROW grants, and RUE grants do not authorize the lessee or grantee to construct any facilities; rather, the lease or grant authorizes the lessee or grantee the right to use the leased area to develop plans, which must be submitted to and approved by BOEM before the lessee or grantee implements its plans (*see* 30 CFR §585.600 and §585.601); and,

WHEREAS, under BOEM's renewable energy regulations, BOEM will review and may approve, approve with modifications, or disapprove Site Assessment Plans (SAPs), Construction and Operations Plans (COPs), General Activities Plans (GAPs), or other plans, collectively "Plans" (*see* 30 CFR 585.613(e), 585.628(f), and 585.648(e)); and,

WHEREAS, BOEM determined that issuing leases and grants and approving Plans constitute undertakings subject to Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. § 470(f)), and its implementing regulations (36 CFR part 800); and,

WHEREAS, the issuance of a commercial lease, limited lease, ROW grant, or RUE grant has the potential to affect historic properties insofar as it may lead to the lessee or grantee conducting geophysical surveying and geotechnical testing; and,

WHEREAS, geophysical surveys consist of towed sensor surveys that will not impact the seafloor and, therefore, BOEM has determined that geophysical surveys are not likely to have the potential to affect historic properties; and,

WHEREAS, the issuance of a research lease or approval of a Plan has the potential to affect historic properties insofar as it may lead to the lessee conducting geotechnical testing; constructing and operating site assessment facilities and renewable energy structures; and, placing and operating transmission cables, pipelines, and/or associated facilities that involve the transportation or transmission of electricity or other energy products from renewable energy projects; and,

WHEREAS, BOEM may issue multiple renewable energy leases and grants and approve multiple Plans associated with each lease or grant issued on the OCS; and,

WHEREAS, BOEM's renewable energy regulations also contemplate the development of a lease in multiple phases (*see* 30 CFR 585.629); and

WHEREAS, BOEM determined that the implementation of the Offshore Renewable Energy Program is complex, as the decisions on these undertakings are phased, and the effects on historic properties are regional in scope, pursuant to 36 CFR 800.14(b); and,

WHEREAS, 36 CFR 800.4(b)(2) provides for deferral of final identification and evaluation of historic properties when provided for in a Programmatic Agreement (Agreement) executed pursuant to 36 CFR 800.14(b); and,

WHEREAS, BOEM determined that the identification and evaluation of historic properties shall be conducted through a phased approach, pursuant to 36 CFR 800.4(b)(2), where the final identification of historic properties may occur after the issuance of a lease or grant and before the approval of a Plan because lessees conduct site characterization surveys in preparation for Plan submittal (*see* 30 CFR part 585); and,

WHEREAS, the deferral of final identification and evaluation of historic properties could result in the discovery of previously unknown historic properties that could significantly impact project planning, siting, and timelines; and,

WHEREAS, 36 CFR 800.14(b)(3) provides for developing programmatic agreements for complex or multiple undertakings and 800.14(b)(1) provides for using such agreements when effects on historic properties cannot be fully determined prior to approval of an undertaking (*see* 800.14(b)(1)(ii)), when effects on historic properties are regional in scope (*see* 800.14(b)(1)(i)), and for other circumstances warranting a departure from the normal Section 106 process (*see* 800.14(b)(1)(v)); and,

WHEREAS, BOEM has consulted in the development of this agreement with the California State Historic Preservation Officer (SHPO), pursuant to 36 CFR part 800, the regulations implementing Section 106 of the NHPA; and,

WHEREAS, the Yurok Tribe is a Tribe, as defined at 36 CFR 800.16(m), that has chosen to consult with BOEM and participate in development of this Agreement; and

WHEREAS, BOEM shall continue to consult with this and other Tribes, Tribal Historic Preservation Officers (THPO), and/or their designee to identify properties of religious and cultural significance that may be eligible for listing in the National Register of Historic Places (including Traditional Cultural Properties) and that may be affected by these undertakings; and,

WHEREAS, in accordance with 36 CFR 800.6(a)(1), BOEM has notified the Advisory Council on Historic Preservation (ACHP) of its intent to develop an Agreement, and the ACHP has chosen to participate in the consultation pursuant to 36 CFR 800.6(a)(1)(iii); and

WHEREAS, the Section 106 consultations described in this Agreement will be used to establish a process to identify historic properties located within the undertakings' Area(s) of Potential Effects (APE); to assess potential effects; and to avoid, reduce, or resolve any adverse effects; and,

WHEREAS, BOEM involves the public and identifies other consulting parties through notifications, requests for comments, existing renewable energy task forces, contact with the SHPO, and National Environmental Policy Act scoping meetings and communications for these proposed actions;

NOW, THEREFORE, BOEM, the California SHPO, and the ACHP agree that Section 106 review shall be conducted in accordance with the following stipulations:

STIPULATIONS

BOEM shall ensure that the following measures are carried out:

- I. The following Stipulation addresses activities associated specifically and solely with undertakings of issuing a commercial lease, limited lease, research lease, ROW grant, or RUE grant. The signatories agree:
 - A. BOEM will delineate the APE as the depth and breadth of the seabed that could potentially be impacted by geotechnical testing.
 - B. BOEM will ensure a reasonable and good faith effort to carry out appropriate identification of historic properties within the APE is conducted, consistent with BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (March 2017; *Guidelines*; see 36 CFR §800.4(b)(1)). Should BOEM wish to alter any archaeological survey-related information included in the *Guidelines*, BOEM will first consult with the signatories. BOEM will also ensure that historic property identification surveys

are carried out using the best commercially available technology to identify tribal and other historic properties in the APE, consistent with the aforementioned guidelines.

- C. Prior to lease or grant issuance under this part, BOEM will identify consulting parties, pursuant to 36 CFR 800.3(f). BOEM will consult on existing, non-proprietary information regarding the proposed undertaking and the geographic extent of the APE, as defined in Stipulation I.A. BOEM also will solicit additional information on potential historic properties within the APE from consulting parties and the public.
- D. BOEM will administratively treat all identified potential historic properties as eligible for inclusion in the National Register unless BOEM determines, and the SHPO, or THPO if on tribal lands, agree that a property is ineligible, pursuant to 36 CFR 800.4(c).
- E. Where practicable, BOEM will require lessees and grantees to avoid effects to historic properties through lease stipulations, resulting in BOEM making a finding of *no historic properties affected*, consistent with 36 CFR 800.4(d)(1). If it is determined that there will be effects to historic properties, BOEM will follow 36 CFR 800.5. Any adverse effects will be resolved by following 36 CFR 800.6 and 36 CFR 800.10 for National Historic Landmarks. In determining practicability under this subparagraph, BOEM will consider factors that include, but are not limited to, public need for a project, commercial viability of a project, adherence to purpose and need, availability of suitable and appropriate mitigations.

II. The following Stipulation specifically addresses activities associated with the undertaking of approving a Plan, except as described under Stipulation IV below. The signatories agree:

- A. BOEM will delineate the APE as the depth and breadth of the seabed that could potentially be impacted by seafloor/bottom-disturbing activities associated with the undertakings; the offshore and onshore viewshed from which renewable energy structures would be visible; and, if applicable, the depth, breadth, and viewshed of onshore locations where transmission cables or pipelines come ashore until they connect to existing power grid structures.
- B. The following constitutes a reasonable and good faith effort to carry out appropriate identification of historic properties (*see* 36 CFR 800.4(b)(1)):
 - 1. For the identification of historic properties within the seabed portion of the APE located on the OCS, BOEM shall utilize historic property identification survey results generated in accordance with BOEM's *Guidelines*.
 - 2. For the identification of historic properties within the seabed portion of the APE located in state submerged lands or within the onshore terrestrial

portion of the APE, BOEM's historic property identification will be conducted in accordance with state (or tribal, if on tribal lands) guidelines. BOEM will request the developer to coordinate with the appropriate regional California Historical Resources Information System Center(s), or THPO if on tribal lands, prior to the initiation of any such identification efforts.

3. For the identification of historic properties within the viewshed portion of the APE, BOEM's historic property identification will be conducted in accordance with state (or tribal, if on tribal lands) guidelines. BOEM will request the developer to coordinate with the appropriate regional California Historical Resources Information System Center(s), or THPO if on tribal lands, prior to the initiation of any such identification efforts.
- C. Prior to approving a Plan, BOEM will identify consulting parties, pursuant to 36 CFR 800.3(f). BOEM will consult on existing, non-proprietary information regarding the proposed undertaking (including the results of historic property identification surveys) and the geographic extent of the APE, as defined in Stipulation II.A. BOEM also will solicit from the consulting parties and the public additional information on potential historic properties within the APE.
 - D. BOEM will treat all identified potential historic properties as eligible for inclusion in the National Register unless BOEM determines, and the SHPOs, or THPO if on tribal lands, agrees, that a property is ineligible, pursuant to 36 CFR 800.4(c).
 - E. Where practicable, as a condition of Plan approval, BOEM will require the lessee to relocate elements of the proposed project that may affect potential historic properties, resulting in BOEM making a finding of *no historic properties affected*, consistent with 36 CFR 800.4(d)(1). In determining practicability under this subparagraph, BOEM will consider factors that include, but are not limited to, public need for a project, commercial viability of a project, adherence to purpose and need, availability of suitable and appropriate mitigations.
 1. If effects to identified properties cannot be avoided, BOEM will evaluate the National Register eligibility of the properties, in accordance with 36 CFR 800.4(c).
 - a. If BOEM determines all of the properties affected are ineligible for inclusion in the National Register, and the SHPO, or THPO if on tribal lands, agrees, BOEM will make a finding of *no historic properties affected*, consistent with 36 CFR 800.4(d)(1).
 - b. If BOEM determines any of the properties affected are eligible for inclusion in the National Register, and the SHPO or THPO if on tribal lands, concurs, and if it is determined that there will be effects to historic properties, BOEM will follow 36 CFR 800.5.

Any adverse effects will be resolved by following 36 CFR 800.6 and 36 CFR 800.10 for National Historic Landmarks.

- c. If a SHPO, or THPO if on tribal lands, disagrees with BOEM's determination regarding whether an affected property is eligible for inclusion in the National Register, or if the ACHP or the Secretary so request, the agency official shall obtain a determination of eligibility from the Secretary pursuant to 36 CFR part 63 (36 CFR 800.4(c)(2)).

III. Activities exempt from review. The signatories agree to exempt from Section 106 review the following categories of activities because they have little or no potential to affect a historic property's National Register qualifying characteristics.

- A. Archaeological Sampling: Vibracores or other direct samples collected, by or under the supervision of a Qualified Marine Archaeologist, for the purposes—at least in part—of historic property identification or National Register eligibility testing and evaluation.
- B. Meteorological Buoys: Proposed installation, operation, and removal of meteorological buoys when the results of geophysical data collected meet the standards established in BOEM's *Guidelines* and either: 1) resulted in the identification of no archaeological site within the seabed portion of the APE for the buoy, or 2) if the project can be relocated so that the APE does not contain an archaeological site, if any such sites are identified during geophysical survey. The signatories agree that offshore meteorological buoys have no effect on onshore historic properties since they are temporary in nature and indistinguishable from lighted vessel traffic.
- C. Meteorological Towers: Proposed construction, installation, operation, and removal of meteorological towers when the following conditions are met:
 - 1. The results of archaeological survey within the offshore APE meet the standards established in BOEM's *Guidelines* and either: 1) resulted in the identification of no archaeological site within the seabed portion of the APE for the tower, or 2) if the project can be relocated so that the offshore APE does not contain an archaeological site, if any such sites are identified during geophysical survey, and
 - 2. The applicant documents that there will be no potential for onshore visibility of the meteorological tower and therefore, no onshore APE or the results of historic property identification within the viewshed APE meet the standards outlined by the SHPO, or THPO if on tribal lands, and no historic properties are identified.
 - 3. If the conditions detailed in III.C.1 and 2 are not met, then those activities would not be considered exempted from review.

- IV. Tribal Consultation. BOEM shall continue to consult with affected Tribes throughout the implementation of this Agreement on subjects related to the undertakings in a government-to-government manner consistent with Executive Order 13175, Presidential memoranda, and the Department of the Interior's Policy on Consultation with Indian Tribes.
- V. Public Participation
- A. Because BOEM and the signatories recognize the importance of public participation in the Section 106 process, BOEM shall continue to provide opportunities for public participation and shall consult with the signatories on possible approaches for keeping the public involved and informed throughout the term of this Agreement.
- B. BOEM shall keep the public informed and may produce reports on historic properties and the Section 106 process that may be made available to the public at BOEM's Pacific OCS Regional office, on the BOEM website, and through other reasonable means insofar as the information shared conforms to the confidentiality clause of this Agreement.
- VI. Confidentiality. Because BOEM and the signatories agree that it is important to withhold from disclosure sensitive information such as that protected by NHPA Section 304 (16 U.S.C. § 470w-3) (e.g., the location, character, and ownership of a historic resource, if disclosure would cause a significant invasion of privacy, risk harm to the historic resources, or impede the use of a traditional religious site by practitioners), BOEM shall:
- A. Request that each signatory inform the other signatories if, by law, regulation or policy, it is unable to withhold sensitive data from public release.
- B. Arrange for the signatories to consult as needed on how to protect such information collected or generated under this Agreement.
- C. Follow, as appropriate, 36 CFR 800.11(c) for authorization to withhold information pursuant to NHPA Section 304, and otherwise withhold sensitive information to the extent allowable by laws including the Freedom of Information Act, 5 U.S.C. § 552, through the Department of the Interior regulations at 43 CFR Part 2.
- D. Request that the signatories agree that materials generated during consultation be treated by the signatories as internal and pre-decisional until they are formally released, although the signatories understand that they may need to be released by one of the signatories if required by law.
- VII. Administrative Stipulations
- A. In coordinating reviews, BOEM shall follow this process:

1. Standard Review: The signatories shall have a standard review period of thirty (30) calendar days for commenting on all documents that are developed under the terms of this Agreement, from the date they are received by the signatory. This includes technical reports of historic property identification and eligibility determinations, as well as agency findings.
 2. Expedited Request for Review: The signatories recognize the time-sensitive nature of this work and shall attempt to expedite comments or concurrence when BOEM so requests. No request for expedited review shall be less than fifteen (15) calendar days.
 3. If a signatory cannot meet BOEM's expedited review period request, it shall notify BOEM in writing within fifteen (15) calendar days.
 4. If a signatory fails to provide comments or respond within the timeframe requested by BOEM (either standard or expedited), then BOEM may proceed as though it received concurrence. BOEM shall consider all comments received within the review period.
 5. Unless otherwise indicated below, all signatories will send correspondence and materials for review via electronic media or an alternate method specified by a signatory for a particular review. Should BOEM transmit the review materials by the alternate method, the review period will begin on the date the materials were received by the signatory, as confirmed by delivery receipt. All submissions to CA SHPO must be in hard copy and mailed to the Office of Historic Preservation at 1725 23rd Street, Suite 100, Sacramento, CA 95816.
 6. Each signatory shall designate a point of contact for carrying out this Agreement and provide this contact's information to the other signatories, updating it as necessary while this Agreement is in force. Updating a point of contact alone shall not necessitate an amendment to this Agreement.
- B. Dispute Resolution. Should any signatory or concurring party to this Agreement object at any time to any actions proposed or the manner in which the terms of this Agreement are implemented, BOEM shall consult with such party to resolve the objection and notify other signatories and concurring parties of the objection. If BOEM determines that such objection cannot be resolved, BOEM will
1. Forward all documentation relevant to the dispute, including BOEM's proposed resolution, to the signatories. The ACHP shall provide BOEM with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, BOEM shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP and

SHPO and provide them and the concurring parties with a copy of this written response. BOEM will then proceed according to its final decision.

2. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, BOEM may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, BOEM shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories to the Agreement, and provide them, the signatories, and concurring parties with a copy of such written response.
 3. BOEM's responsibility to carry out all actions subject to the terms of this Agreement that are not subject of dispute shall remain unchanged.
- C. Amendments. Any signatory may propose to BOEM in writing that this Agreement be amended, whereupon BOEM shall consult with the signatories to consider such amendment. This Agreement may then be amended when agreed to in writing by all signatories, becoming effective on the date that the amendment is executed by the ACHP as the last signatory.
- D. BOEM shall prepare an annual report that will summarize actions taking place between October 1st and September 30th and make this report available to signatories and concurring parties by December 31st of each year this Agreement is in effect. The annual report will summarize any activities exempted from review under this Section, as well as any other actions taken to implement the terms of this Agreement. Upon submission of the annual report, BOEM shall consult with the signatories and concurring parties on the substance of the report. Should any party desire to meet, BOEM will schedule said consultation meeting within 30 days of receiving a written request.
- E. Coordination with other Federal agencies. In the event that another Federal agency believes it has Section 106 responsibilities related to the undertakings, which are the subject of this Agreement, BOEM will request to coordinate its review with those other agencies. Additionally, that agency may attempt to satisfy its Section 106 responsibilities by agreeing in writing to the terms of this Agreement and notifying and consulting with the SHPO, THPO or tribal designee, and the ACHP. Any modifications to this Agreement that may be necessary for meeting that agency's Section 106 obligations shall be considered in accordance with this Agreement.
- F. Terms and Duration of Agreement.
1. Unless terminated, pursuant to Stipulation VII.G. or amended, pursuant to Stipulation VII.C., this Agreement shall remain in full force for seven (7) years from the date this Agreement is executed, defined as the date the last signatory signs. If BOEM wishes to amend the PA to extend its duration, BOEM shall initiate such consultation to amend the PA, pursuant to

Stipulation VII.C, no less than three (3) months prior to the expiration date of the PA.

G. Termination.

1. If any signatory determines that the terms of this Agreement cannot be carried out or are not being carried out, that signatory shall notify the other signatories in writing and consult with them to seek amendment of the Agreement. If within sixty (60) calendar days of such notification, an amendment cannot be made, any signatory may terminate the Agreement upon written notice to the other signatories.
2. Once the Agreement is terminated, and prior to work continuing on the undertaking, BOEM must either (a) execute a new Agreement pursuant to 36 CFR 800.14 or (b) consult on each undertaking individually, pursuant to 36 CFR part 800. BOEM shall notify the signatories and concurring parties as to the course of action it will pursue.
3. If termination is occasioned by BOEM's final decision on the last Plan considered under the Renewable Energy Regulations, BOEM shall notify the signatories and the public, in writing.

H. Anti-Deficiency Act. Pursuant to 31 U.S.C. § 1341(a)(1), nothing in this Agreement shall be construed as binding the United States to expend in any one fiscal year any sum in excess of appropriations made by Congress for this purpose, or to involve the United States in any contract or obligation for the further expenditure of money in excess of such appropriations.

I. Existing Law and Rights. Nothing in this Agreement shall abrogate existing laws or the rights of any consulting party or signatory to this Agreement.

AGREED

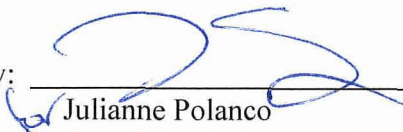
Execution of this Agreement by BOEM, the California SHPO, and the ACHP, and the implementation of its terms are evidence that BOEM has taken into account the effects of these undertakings on historic properties and afforded the ACHP an opportunity to comment.

SIGNATORIES

U.S. Department of the Interior, Bureau of Ocean Energy Management

By: Joan R. Barminski Date: 12/10/2019
Joan R. Barminski
Regional Director, Pacific OCS Office
Bureau of Ocean Energy Management
Department of Interior Regions 8, 9, 10, and 12

State Historic Preservation Office, California Office of Historic Preservation

By:  _____ Date: 12/13/19 _____
Julianne Polanco
State Historic Preservation Officer
California Office of Historic Preservation
California State Parks

Advisory Council on Historic Preservation

By: Aimee Jorjani

Date: 12/18/19

Aimee Jorjani
Chairman
Advisory Council on Historic Preservation

CONCURRING PARTIES

[Tribal Nation]

By:

Date:

[NAME]
[TITLE]
[Tribal Nation]

**APPENDIX
PROGRAMMATIC AGREEMENT**

Among

**The U.S. Department of the Interior, Bureau of Ocean Energy Management,
The State Historic Preservation Officer of California,
The Advisory Council on Historic Preservation
Regarding Review of Outer Continental Shelf Renewable Energy Activities
Offshore California
Under Section 106 of the National Historic Preservation Act**

Commercial lease means a lease, issued under the renewable energy regulations, that specifies the terms and conditions under which a person can conduct commercial activities (*see* 30 CFR §585.112);

Commercial activities mean, for renewable energy leases and grants, all activities associated with the generation, storage, or transmission of electricity or other energy products from a renewable energy project on the Outer Continental Shelf (OCS), and for which such electricity or other energy product is intended for distribution, sale, or other commercial use, except for electricity or other energy products distributed or sold pursuant to technology-testing activities on a limited lease. This term also includes activities associated with all stages of development, including initial site characterization and assessment, facility construction, and project decommissioning (*see* 30 CFR §585.112);

Limited lease means a lease, issued under the renewable energy regulations, that specifies the terms and conditions under which a person may conduct activities on the OCS that support the production of energy, but do not result in the production of electricity or other energy products for sale, distribution, or other commercial use exceeding a limit specified in the lease (*see* 30 CFR §585.112);

Research lease means an OCS lease, Right-of-Way (ROW) grant, and/or Right-of-Use (RUE) grant, issued under the renewable energy regulations at 30 CFR §585.238, to a Federal agency or a state for renewable energy research activities that support the future production, transportation, or transmission of renewable energy;

ROW grant means an authorization issued under the renewable energy regulations to use a portion of the OCS for the construction and use of a cable or pipeline for the purpose of gathering, transmitting, distributing, or otherwise transporting electricity or other energy product generated or produced from renewable energy. A ROW grant authorizes the holder to install on the OCS cables, pipelines, and associated facilities that involve the transportation or transmission of electricity or other energy products from renewable energy projects (*see* 30 CFR §585.112);

RUE grant means an easement issued under the renewable energy regulations that authorizes use of a designated portion of the OCS to support activities on a lease or other use authorization for renewable energy activities. A RUE grant authorizes the holder to construct and maintain facilities or other installations on the OCS that support the production, transportation, or

transmission of electricity or other energy products from any renewable energy resource (*see* 30 CFR §585.112);

Geotechnical testing means the process by which site-specific sediment and underlying geologic data are acquired from the seafloor and the sub-bottom and includes, but is not limited to, such methods as borings, vibracores, and cone penetration tests;

Geophysical survey means a marine remote-sensing survey using, but not limited to, such equipment as side-scan sonar, magnetometer, shallow and medium (seismic) penetration sub-bottom profiler systems, narrow beam or multibeam echo sounder, or other such equipment employed for the purposes of providing data on geological conditions, identifying shallow hazards, identifying archaeological resources, charting bathymetry, and gathering other site characterization information;

Historic property means any pre-contact or historic period district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (*see* 36 CFR §800.16(1)(1));

Qualified architectural historian means a person who meets the Secretary of the Interior's Professional Qualification Standards for architectural history (48 FR 44738-44739) and meets the SHPO or THPO professional qualification standards, and has experience identifying tribal cultural resources and analyzing structures, historic districts, and landscapes.

Qualified marine archaeologist means a person who meets the Secretary of the Interior's Professional Qualification Standards for Archaeology (48 FR 44738-44739), and has experience analyzing marine geophysical data;

Tribal land means all lands within the exterior boundaries of any Indian reservation, all dependent Indian communities (*see* 36 CFR §800.16(x));

APPENDIX D

Typical Mitigation Measures for Protected Marine Mammal Species

Typical Mitigation Measures for Protected Marine Mammal Species

Any survey monitoring plan must meet the following minimum requirements specified below, except when complying with these requirements would put the safety of the vessel or crew at risk.

A. Minimize Interactions with Protected Species during Geophysical Survey Operations

To avoid injury of protected marine mammal species and minimize any potential disturbance, the following measures will be implemented for all vessels operating survey equipment in the boomer, sparker, and bubble gun equipment categories, and equipment with similar specifications within these categories.

Required mitigations:

1. For situational awareness a Monitoring Zone (1,000 meters (m) (3,281 feet (ft) in all directions) for protected species must be monitored around all vessels operating boomer, sparker, or bubble gun equipment.
 - a. The Monitoring Zone must be monitored by approved third-party protected species observers (PSOs) at all times and any observed listed species must be recorded (see reporting requirements below).
 - b. For monitoring around an autonomous surface vessel (ASV), where remote PSO monitoring must occur from the mother vessel, a dual thermal/HD camera must be installed on the mother vessel facing forward and angled in a direction so as to provide a field of view ahead of the vessel and around the ASV. PSOs must be able to monitor the real-time output of the camera on hand-held computer tablets. Images from the cameras must be able to be captured and reviewed to assist in verifying species identification. A monitor must also be installed in the bridge displaying the real-time images from the thermal/HD camera installed on the front of the ASV itself, providing a further forward view of the craft. In addition, night-vision goggles with thermal clip-ons and a handheld spotlight must be provided and used such that PSOs can focus observations in any direction around the mother vessel and/or the ASV.
2. To minimize exposure to noise that could be disturbing, a 500 m Exclusion Zone for ESA-listed whale species visible at the surface must be established around each vessel operating boomer, sparker, or bubble gun equipment.
 - a. The Exclusion Zone(s) must be monitored by third-party PSOs at all times when noise-producing equipment is being operated and all observed listed species must be recorded (see reporting requirements below).
 - b. If an ESA-listed whale is detected within or entering the respective Exclusion Zone, any noise-producing equipment operating below 180 kHz must be shut off until the minimum separation distance (see vessel strike avoidance below) is re-established and the measures in (5) are carried out.
 - i. A PSO must notify the survey crew that a shutdown of all active boomer, sparker, and bubble gun acoustic sources below 180 kHz is immediately required. The vessel operator and crew must comply immediately with any call for a shutdown by the PSO. Any disagreement or discussion must occur only after shutdown.

- c. If the Exclusion Zone(s) cannot be adequately monitored for whale presence (i.e., a PSO determines conditions, including at night or other low-visibility conditions, are such that listed whales cannot be reliably sighted within the Exclusion Zone(s), the survey must be stopped until such time that the Exclusion Zone(s) can be reliably monitored.
3. Before any noise-producing survey equipment is deployed, the Monitoring Zone (1,000 m (3,281 ft) for all marine mammal species) must be monitored for 30 minutes of pre-clearance observation.
 - a. If any ESA-listed species is observed within the Monitoring Zone during the 30-minute pre-clearance period, the 30-minute clock must be paused. If the PSO confirms the animal has exited the zone and headed away from the survey vessel, the 30-minute clock that was paused may resume. The pre-clearance clock will reset to 30 minutes if the animal dives or visual contact is otherwise lost.
4. The Lessee must ensure that, when technically feasible, a “ramp up” of the electromechanical survey equipment occurs at the start or re-start of geophysical survey activities. A ramp up must begin with the power of the smallest acoustic equipment for the geophysical survey at its lowest power output. When technically feasible the power will then be gradually turned up and other acoustic sources added in a way such that the source level would increase gradually.
5. Following a shutdown for any reason, ramp up of the equipment may begin immediately only if: (a) the shutdown is less than 30 minutes, (b) visual monitoring of the Exclusion Zone(s) continued throughout the shutdown, (c) the animal(s) causing the shutdown was visually followed and confirmed by PSOs to be outside of the Exclusion Zone(s) and heading away from the vessel, and (d) the Exclusion Zone(s) remains clear of all listed species. If all (a, b, c, and d) the conditions are not met, the Monitoring Zone (1,000 m (3,281 ft) for all species) must be monitored for 30 minutes of pre-clearance observation before noise-producing equipment can be turned back on.
6. In order for geophysical surveys to be conducted at night or during low-visibility conditions, PSOs must be able to effectively monitor the Exclusion Zone(s). No surveys may occur if the Exclusion Zone(s) cannot be reliably monitored for the presence of ESA-listed whales to ensure avoidance of injury to those species.
 - a. The Lessee must submit an Alternative Monitoring Plan (AMP) to the Bureau of Ocean Energy Management (BOEM) detailing the monitoring methodology that will be used during nighttime and low-visibility conditions and an explanation of how it will be effective at ensuring that the Exclusion Zone(s) can be maintained during nighttime and low-visibility survey operations. The plan must be submitted 60 days before survey operations are set to begin.
 - b. The plan must include technologies that have the technical feasibility to detect all ESA-listed whales out to 500 m (1,640 ft).
 - c. PSOs should be trained and experienced with the proposed night vision technology.
 - d. The AMP must describe how calibration will be performed, for example, by including observations of known objects at set distances and under various lighting conditions. This calibration could be performed during mobilization and periodically throughout the survey operation.
 - e. PSOs shall make nighttime observations from a platform with no visual barriers, due to the potential for the reflectivity from bridge windows or other structures to interfere with the use of the night vision optics.

7. If multiple survey vessels are operating within a lease, adjacent lease areas, or exploratory cable routes, a minimum separation distance (to be determined on a survey specific basis, dependent on equipment being used) must be maintained between survey vessels to ensure that sound sources do not overlap.
8. Any visual observations of listed species by crew or project personnel must be communicated to PSOs on-duty.
9. During good conditions (e.g., daylight hours; Beaufort scale 3 or less) when survey equipment is not operating, to the maximum extent practicable, PSOs must conduct observations for listed species for comparison of sighting rates and behavior with and without use of active geophysical survey equipment. Any observed listed species must be recorded regardless of any mitigation actions required.

B. Minimize Vessel Interactions with Listed Species

All vessels associated with survey activities (transiting or actively surveying) must comply with the vessel strike avoidance measures specified below. The only exception is when the safety of the vessel or crew necessitates deviation from these requirements. If any such incidents occur, they must be reported as outlined below.

Required mitigations:

1. Vessel captain and crew must maintain a vigilant watch for all protected marine mammal species and slow down, stop their vessel, or alter course, as appropriate, regardless of vessel size, to avoid striking any protected species. The presence of a single individual at the surface may indicate the presence of submerged animals in the vicinity; therefore, precautionary measures should always be exercised.
2. Any time a survey vessel is underway (transiting or surveying), a PSO must monitor a Vessel Strike Avoidance Zone (500 m (1,640 ft) or greater from any sighted whales or other unidentified large marine mammal and 50 m (164 ft) or greater from any other marine mammal species visible at the surface, unless the marine mammals are actively approaching the vessel) to ensure detection of that animal in time to take necessary measures to avoid striking the animal. If the survey vessel does not require a PSO for the type of survey equipment used, a trained crew lookout or PSO may be used. For monitoring around the autonomous surface vessels, regardless of the equipment it may be operating, a dual thermal/HD camera must be installed on the mother vessel facing forward and angled in a direction so as to provide a field of view ahead of the vessel and around the ASV. A dedicated operator must be able to monitor the real-time output of the camera on hand-held computer tablets. Images from the cameras must be able to be captured and reviewed to assist in verifying species identification. A monitor must also be installed in the bridge displaying the real-time images from the thermal/high definition (HD) camera installed on the front of the ASV itself, providing a further forward view of the craft.
 - a. Survey plans must include identification of vessel strike avoidance measures, including procedures for equipment shut down and retrieval, communication between PSOs/crew lookouts, equipment operators, and the captain, and other measures necessary to avoid vessel strike while maintaining vessel and crew safety. If any circumstances are anticipated that may preclude the implementation of this requirement, they must be clearly identified in the survey

plan and alternative procedures outlined in the plan to ensure minimum distances are maintained and vessel strikes can be avoided.

- b. All vessel crew members must be briefed in the identification of protected marine mammal species that may occur in the survey area and in regulations and best practices for avoiding vessel collisions. Reference materials must be available aboard all project vessels for identification of listed species. The expectation and process for reporting of protected species sighted during surveys must be clearly communicated and posted in highly visible locations aboard all project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process outlined for crew members to do so.
 - c. A minimum separation distance of 500 m (1,640 ft) from all whales (including unidentified large whales) must be maintained around all surface vessels at all times.
 - d. If a large whale is identified within 500 m of the forward path of any vessel, the vessel operator must steer a course away from the whale at 10 knots (18.5 km/hr) or less until the 500 m minimum separation distance has been established. Vessels may also shift to idle if feasible.
 - e. If a large whale is sighted within 200 m (656 ft) of the forward path of a vessel, the vessel operator must reduce speed and shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 500 m (1,640 ft). If stationary, the vessel must not engage engines until the large whale has moved beyond 500 m.
3. To monitor the Vessel Strike Avoidance Zone, a PSO (or crew lookout if PSOs are not required) must be posted during all times a vessel is underway (transiting or surveying) to monitor for protected species within a 180-degree direction of the forward path of the vessel (90 degrees port to 90 degrees starboard).
 - a. If the trained lookout is a vessel crew member, this must be their designated role and primary responsibility while the vessel is underway. Any designated crew lookouts must receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements. All observations must be recorded per reporting requirements.
 - b. Regardless of monitoring duties, all crew members responsible for navigation duties must receive site-specific training on protected species sighting/reporting and vessel strike avoidance measures.
 4. Vessels underway must not divert their course to approach any listed species.
 5. Wherever available, the Lessee must ensure all vessel operators check for daily information regarding protected species sighting locations. These media may include, but are not limited to: Channel 16 broadcasts, and the Whale/Ocean Alert app.

C. Entanglement Avoidance

Any mooring systems used during survey activities prevent any potential entanglement or entrainment of listed species, and in the unlikely event that entanglement does occur, ensure proper reporting of entanglement events according to the measures specified below.

Required Mitigations:

1. The Lessee must ensure that any buoys attached to the seafloor use the best available mooring systems. Buoys, lines (chains, cables, or coated rope systems), swivels, shackles, and anchor designs must prevent any potential entanglement of listed species while ensuring the safety and integrity of the structure or device.
2. All mooring lines and ancillary attachment lines must use one or more of the following measures to reduce entanglement risk: shortest practicable line length, rubber sleeves, weak-links, chains, cables or similar equipment types that prevent lines from looping, wrapping, or entrapping protected species.
3. Any equipment must be attached by a line within a rubber sleeve for rigidity. The length of the line must be as short as necessary to meet its intended purpose.
4. If a live or dead marine protected species becomes entangled, the Lessee must immediately contact the applicable stranding network coordinator using the reporting contact details (see Reporting Requirements, section E below) and provide any on-water assistance requested.
5. All buoys must be properly labeled with the Lessee's contact information.

D. Protected Species Observers

The Lessee must use qualified third-party PSOs to observe Monitoring and Exclusion Zones as outlined in the conditions above.

Required Mitigations:

1. All PSOs must have received NMFS approval to act as a PSO for geophysical surveys. The Lessee must provide to BOEM, upon request, documentation of NMFS approval as PSOs for geophysical activities in the Pacific and copies of the most recent training certificates of individual PSOs' successful completion of a commercial PSO training course with an overall examination score of 80% or greater. Instructions and application requirements to become a NMFS- approved PSO can be found at: <https://www.fisheries.noaa.gov/new-england-mid-atlantic/careers-and-opportunities/protected-species-observers>.
2. Crew members serving as lookouts must receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements.
3. PSOs deployed for geophysical survey activities must be employed by a third-party observer provider. While the vessel is underway, they must have no other tasks other than to conduct observational effort, record data, and communicate with and instruct relevant vessel crew to the presence of protected marine mammal species and associated mitigation requirements. PSOs on duty must be clearly listed on daily data logs for each shift.
 - a. Non-third-party observers may be approved by NMFS on a case-by-case basis for limited, specific duties in support of approved third-party PSOs.
4. A minimum of one PSO (assuming condition 5 is met) must be observing for protected marine mammal species at all times when noise-producing equipment is operating, or the survey vessel is

actively transiting. The Lessee must include a PSO schedule showing that the number of PSOs used is sufficient to effectively monitor the affected area for the project (e.g., surveys) and record the required data. PSOs must not be on watch for more than 4 consecutive hours, with at least a 2-hour break after a 4-hour watch. PSOs must not work for more than 12 hours in any 24-hour period.

5. Visual monitoring must occur from the most appropriate vantage point on the associated operational platform that allows for 360-degree visual coverage around the vessel. If 360-degree visual coverage is not possible from a single vantage point, multiple PSOs must be on watch to ensure such coverage.
6. The Lessee must ensure that suitable equipment is available to each PSO to adequately observe the full extent of the Monitoring and Exclusion Zones during all vessel operations and meet all reporting requirements.
 - a. Visual observations must be conducted using binoculars and the naked eye while free from distractions and in a consistent, systematic, and diligent manner.
 - b. Rangefinders (at least one per PSO, plus backups) or reticle binoculars (e.g., 7 x 50) of appropriate quality (at least one per PSO, plus backups) to estimate distances to listed species located in proximity to the vessel and Monitoring and Exclusion Zone(s).
 - c. Digital cameras with a telephoto lens that is at least 300 mm or equivalent on a full-frame single lens reflex (SLR). The camera or lens should also have an image stabilization system. The camera system must be used to record sightings and verify species identification whenever possible.
 - d. A laptop or tablet to collect and record data electronically.
 - e. Global Positioning System (GPS) Units if data collection/reporting software does not have built-in positioning functionality.
 - f. PSO data must be collected in accordance with standard data reporting software tools, and electronic data submission standards approved by BOEM and the National Marine Fisheries Service (NMFS) for the particular activity.
 - g. Any other tools deemed necessary to adequately perform PSO tasks.

E. Reporting Requirements

To ensure compliance and evaluate effectiveness of mitigation measures, regular reporting of survey activities and information on protected species will be required as follows.

Required Mitigations:

1. Data from all PSO observations must be recorded based on standard PSO collection and reporting requirements. PSOs must use standardized electronic data forms to record data. The following information must be reported electronically in a format approved by BOEM and NMFS:

Visual Effort:

- a. Vessel name.
- b. Dates of departures and returns to port with port name.
- c. Lease number.

- d. PSO names and affiliations.
- e. PSO ID (if applicable).
- f. PSO location on vessel.
- g. Height of observation deck above water surface.
- h. Visual monitoring equipment used.
- i. Dates and times (Greenwich Mean Time) of survey on/off effort and times corresponding with PSO on/off effort.
- j. Vessel location (latitude/longitude, decimal degrees) when survey effort begins and ends; vessel location at beginning and end of visual PSO duty shifts; recorded at 30-second intervals if obtainable from data collection software.
- k. Vessel heading and speed at beginning and end of visual PSO duty shifts and upon any change.
- l. Water depth (if obtainable from data collection software).
- m. Environmental conditions while on visual survey (at beginning and end of PSO shift and whenever conditions change significantly), including wind speed and direction, Beaufort scale, Beaufort wind force, swell height, swell angle, precipitation, cloud cover, temperature, sun glare, and overall visibility to the horizon.
- n. Factors that may be contributing to impaired observations during each PSO shift change or as needed as environmental conditions change (e.g., vessel traffic, equipment malfunctions).
- o. Survey activity information, such as type of survey equipment in operation, acoustic source power output while in operation, and any other notes of significance (i.e., pre-clearance survey, ramp-up, shutdown, end of operations, etc.).

Visual Sighting (all Visual Effort fields plus):

- a. Watch status (sighting made by PSO on/off effort, opportunistic, crew, alternate vessel/platform).
- b. Vessel/survey activity at time of sighting.
- c. PSO/PSO ID who sighted the animal.
- d. Time of sighting.
- e. Initial detection method.
- f. Sightings cue.
- g. Vessel location at time of sighting (decimal degrees).
- h. Direction of vessel's travel (compass direction).
- i. Direction of animal's travel relative to the vessel.
- j. Identification of the animal (e.g., genus/species, lowest possible taxonomic level, or unidentified); also note the composition of the group if there is a mix of species.
- k. Species reliability.
- l. Radial distance.

- m. Distance method.
 - n. Group size; estimated number of animals (high/low/best).
 - o. Estimated number of animals by cohort (adults, yearlings, juveniles, calves, group composition, etc.).
 - p. Description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics).
 - q. Detailed behavior observations (e.g., number of blows, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; note any observed changes in behavior).
 - r. Mitigation Action. Description of any actions implemented in response to the sighting (e.g., delays, shutdown, ramp-up, speed or course alteration, etc.) and time and location of the action.
 - s. Behavioral Observation to Mitigation.
 - t. Equipment Operating During Sighting.
 - u. Source Depth.
 - v. Source Frequency.
 - w. Animal's closest point of approach and/or closest distance from the center point of the acoustic source.
 - x. Time Entered Exclusion Zone.
 - y. Time Exited Exclusion Zone.
 - z. Time in Exclusion Zone.
 - aa. Photos/Video.
2. The PSO Provider or Lessee must submit raw PSO sightings and trackline data by the 15th of each month for the previous calendar month of surveys to renewable_reporting@boem.gov and incidental.take@noaa.gov. Data must be submitted in Excel spreadsheet format or in another format approved by BOEM and NMFS.
 3. The Lessee must submit a monitoring report to BOEM and NMFS within 90 days after completion of yearly survey activities. The report must fully document the methods and monitoring protocols, summarize the data recorded during monitoring, estimate the number of protected species that may have been taken during survey activities; and describe, assess, and compare the effectiveness of monitoring and mitigation measures. PSO raw sightings and trackline data must also be provided with the final monitoring report.
 4. In the event of a vessel strike of a protected species by any survey vessel, the Lessee must immediately report the incident to BOEM (renewable_reporting@boem.gov) and NMFS (incidental.take@noaa.gov) and the NOAA West Coast Region Stranding Hotline at 1-866-767-6114. The report must include the following information:
 - a. Name, telephone, and email or the person providing the report.

- b. The vessel name.
 - c. The Lease Number.
 - d. Time, date, and location (latitude/longitude) of the incident.
 - e. Species identification (if known) or description of the animal(s) involved.
 - f. Vessel's speed during and leading up to the incident.
 - g. Vessel's course/heading and what operations were being conducted (if applicable).
 - h. Status of all sound sources in use.
 - i. Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike.
 - j. Environmental conditions (wave height, wind speed, light, cloud cover, weather, water depth).
 - k. Estimated size and length of animal that was struck.
 - l. Description of the behavior of the species immediately preceding and following the strike.
 - m. If available, description of the presence and behavior of any other protected species immediately preceding the strike.
 - n. Disposition of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, last sighted direction of travel, status unknown, disappeared).
 - o. To the extent practicable, photographs or video footage of the animal(s).
5. The Lessee must ensure that sightings of any injured or dead listed species are immediately reported, regardless of whether the injury or death is related to survey operations, to BOEM (renewable_reporting@boem.gov), NMFS (incidental.take@noaa.gov), and the NOAA West Coast stranding hotline at 1-866-767-6114. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assist in any salvage effort as requested by NMFS. When reporting sightings of injured or dead listed species, the following information must be included:
- a. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable).
 - b. Species identification (if known) or description of the animal(s) involved.
 - c. Condition of the animal(s) (including carcass condition if the animal is dead).
 - d. Observed behaviors of the animal(s), if alive.
 - e. If available, photographs or video footage of the animal(s).
 - f. General circumstances under which the animal was discovered.
6. Reporting and Contact Information:
- a. Dead and/or Injured Protected Species:
 - 1. NOAA West Coast stranding hotline at 1-866-767-6114.
 - i. Injurious Takes of Endangered and Threatened Species:
 - 1. NOAA NMFA Long Beach Office, Protected Resources Division (incidental.take@noaa.gov)

2. BOEM Environment Branch for Renewable Energy, Phone: 703-787-1340, Email: renewable_reporting@boem.gov



U.S. Department of the Interior (DOI)

The DOI protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.



Bureau of Ocean Energy Management (BOEM)

BOEM's mission is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.

BOEM Environmental Studies Program

The mission of the Environmental Studies Program is to provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production activities on human, marine, and coastal environments. The proposal, selection, research, review, collaboration, production, and dissemination of each of BOEM's Environmental Studies follows the DOI Code of Scientific and Scholarly Conduct, in support of a culture of scientific and professional integrity, as set out in the DOI Departmental Manual (305 DM 3).