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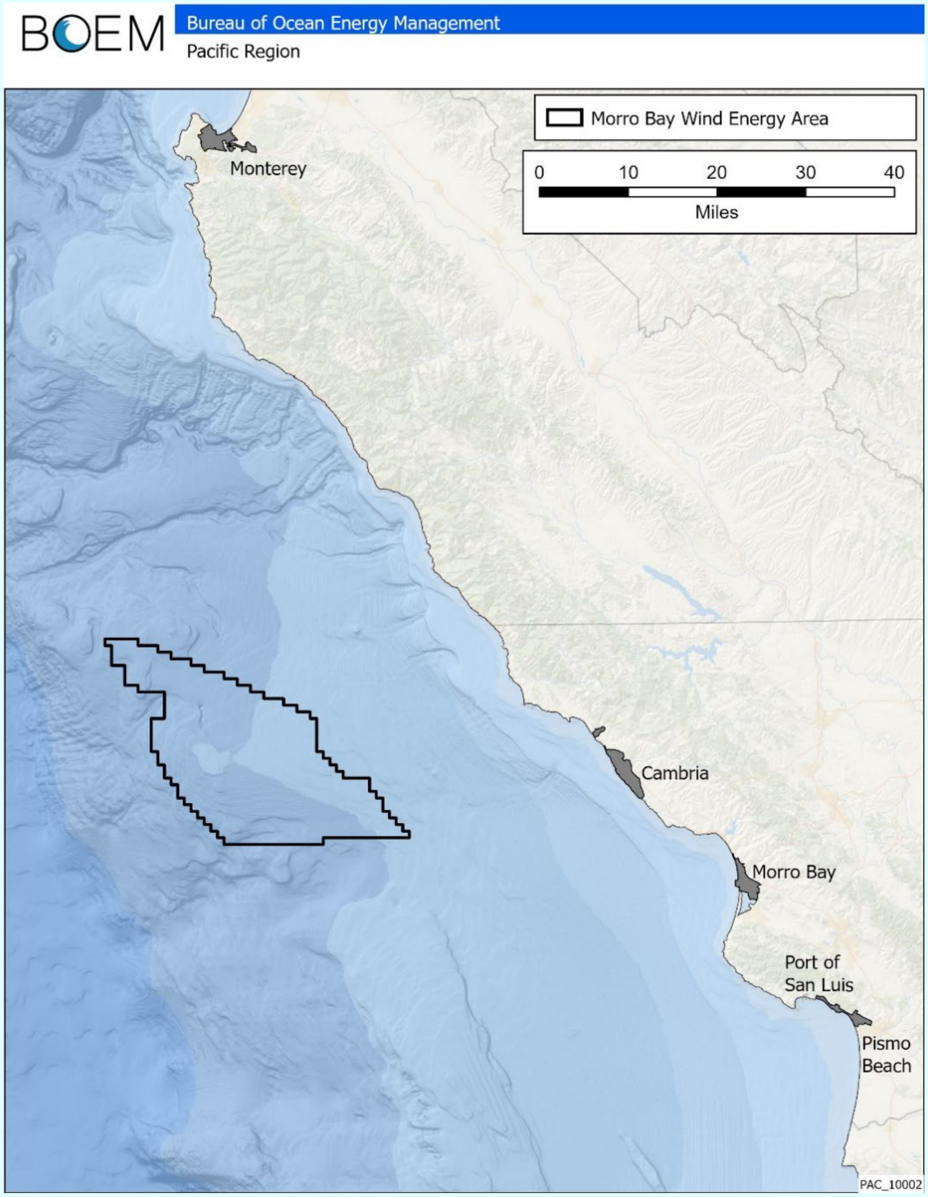
Commercial Wind Lease and Grant Issuance and Site Assessment Activities on the Pacific Outer Continental Shelf, Morro Bay Wind Energy Area, California



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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/km^2

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)

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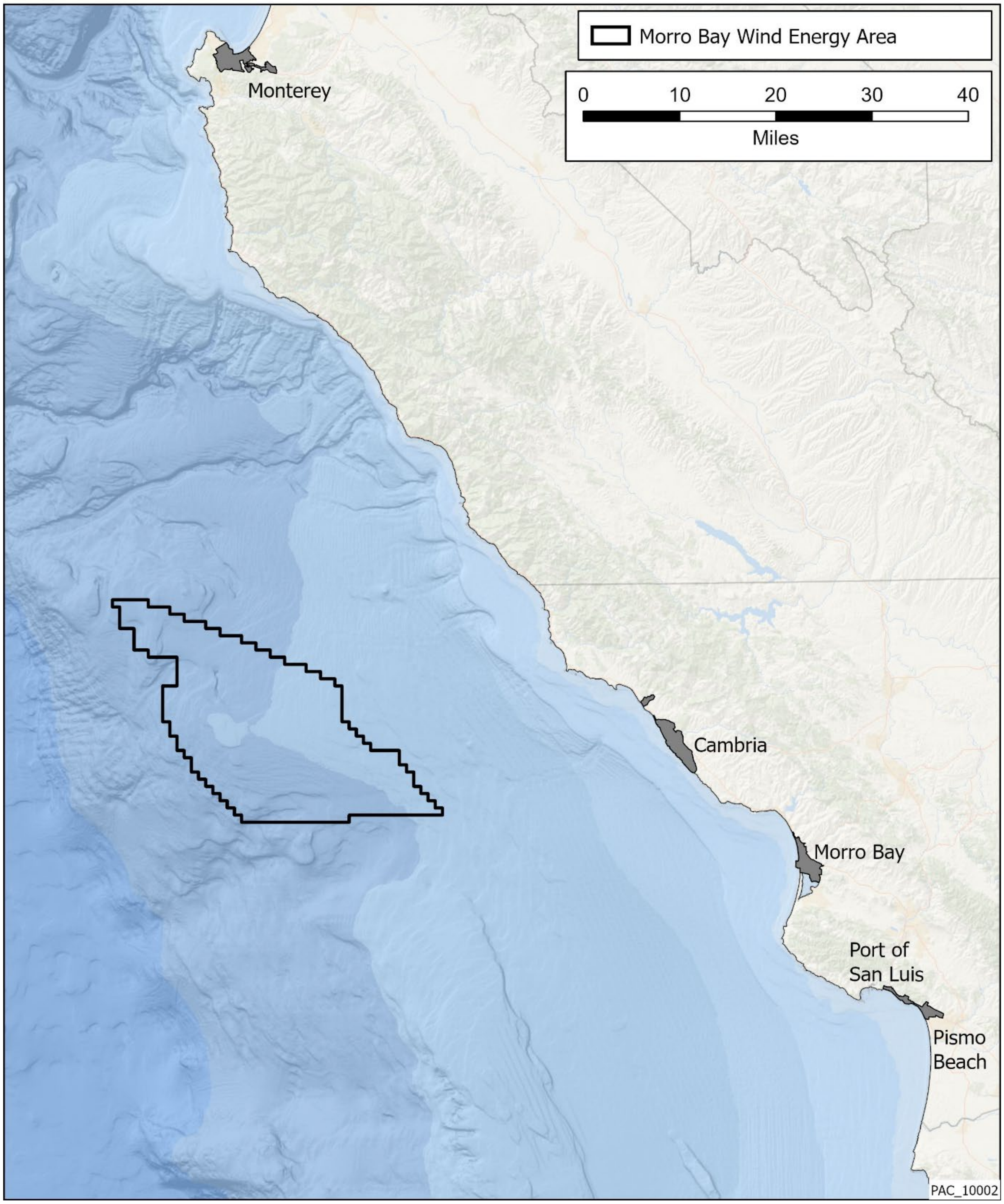


Figure 1-1: Map of Morro Bay Wind Energy Area offshore California

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.

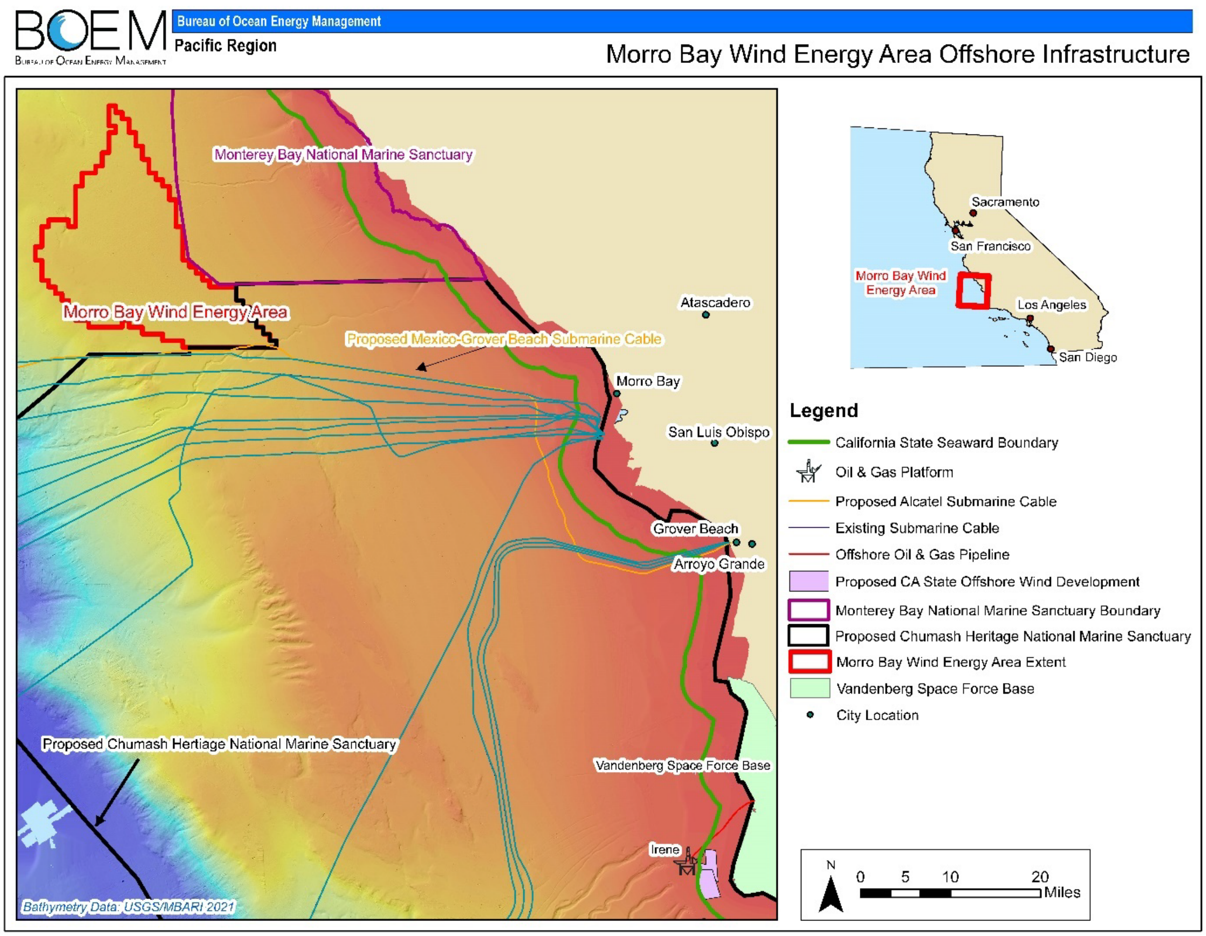


Figure 2-1: Morro Bay Wind Energy Area Offshore Infrastructure

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.

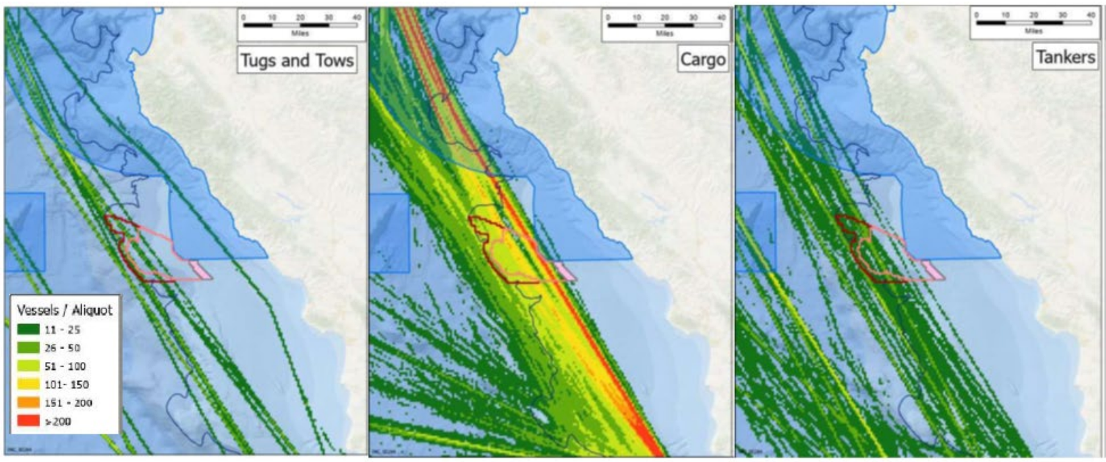


Figure 2-2: Vessel Traffic From 2017 for Tugs and Tows, Cargo, and Tankers In and Near the Morro Bay Wind Energy Area

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 (m^2) 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).

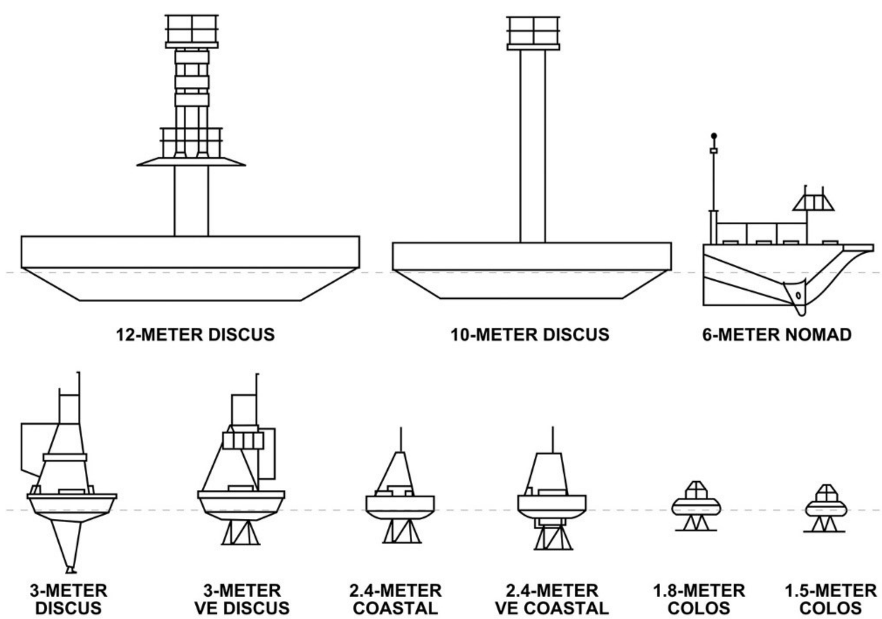


Figure 2-3: Buoy Schematic

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 or 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.

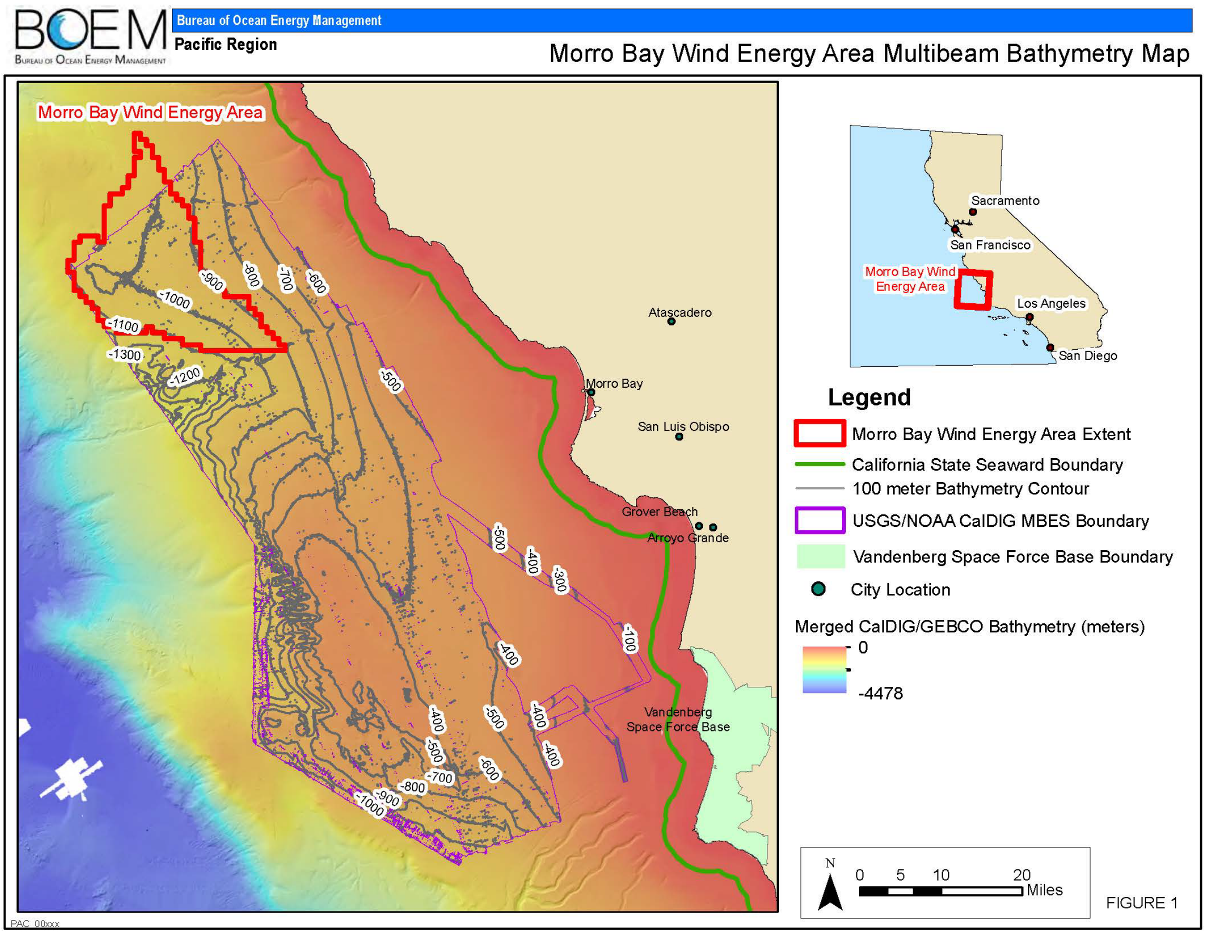


Figure 3-1: Central California Multibeam Bathymetry Released by United States Geologic Survey

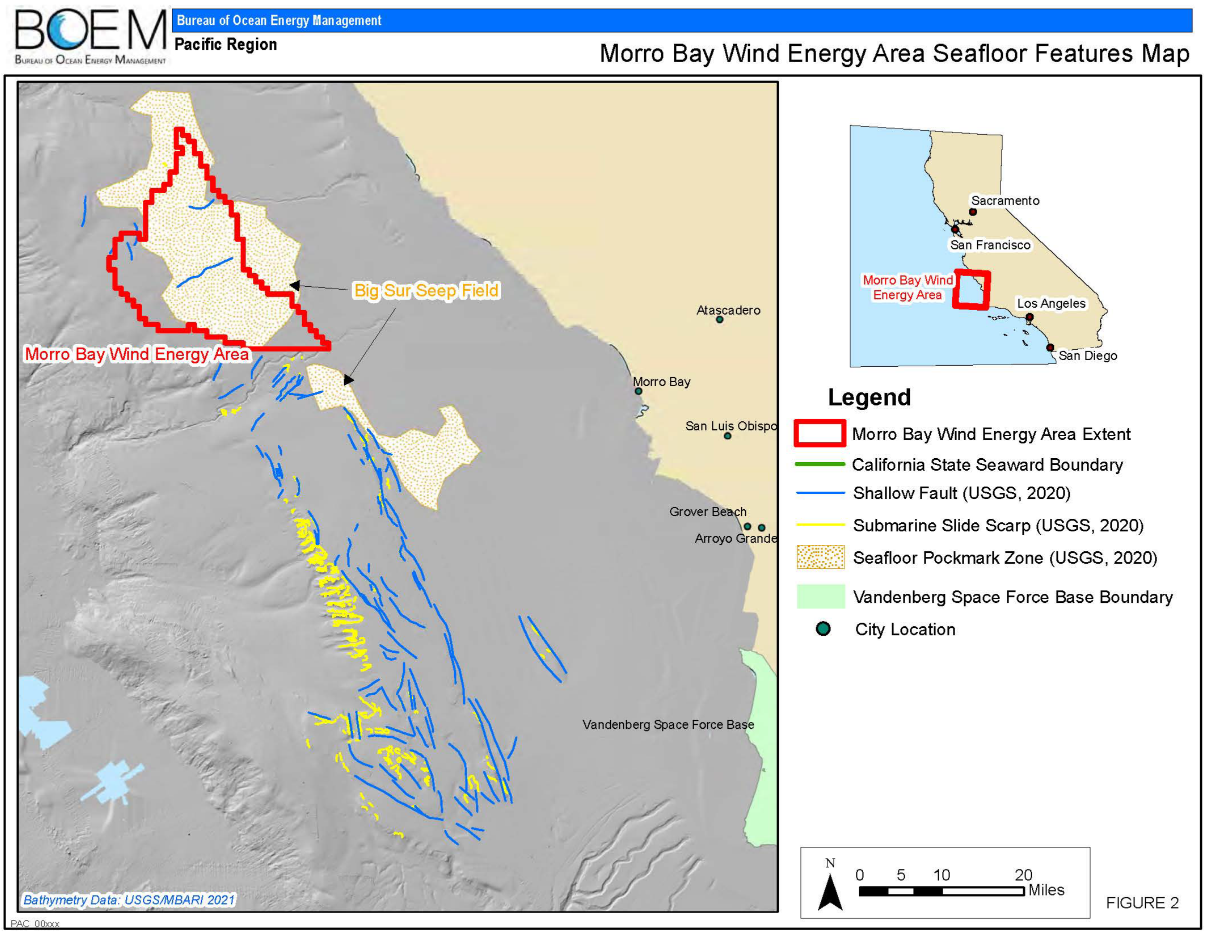


Figure 3-2: Morro Bay Wind Energy Area Seafloor Features

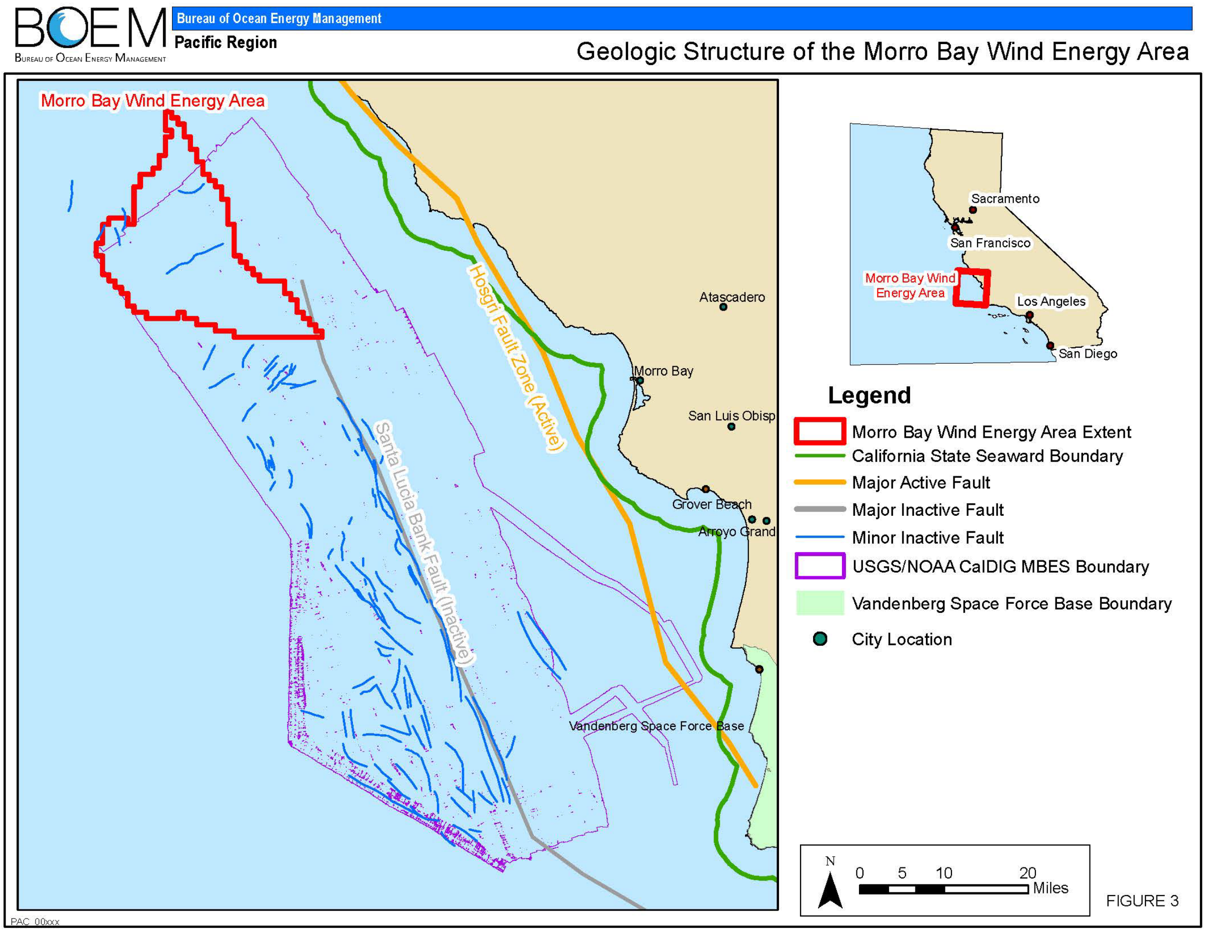


Figure 3-3: Morro Bay Wind Energy Area Geologic Structure

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

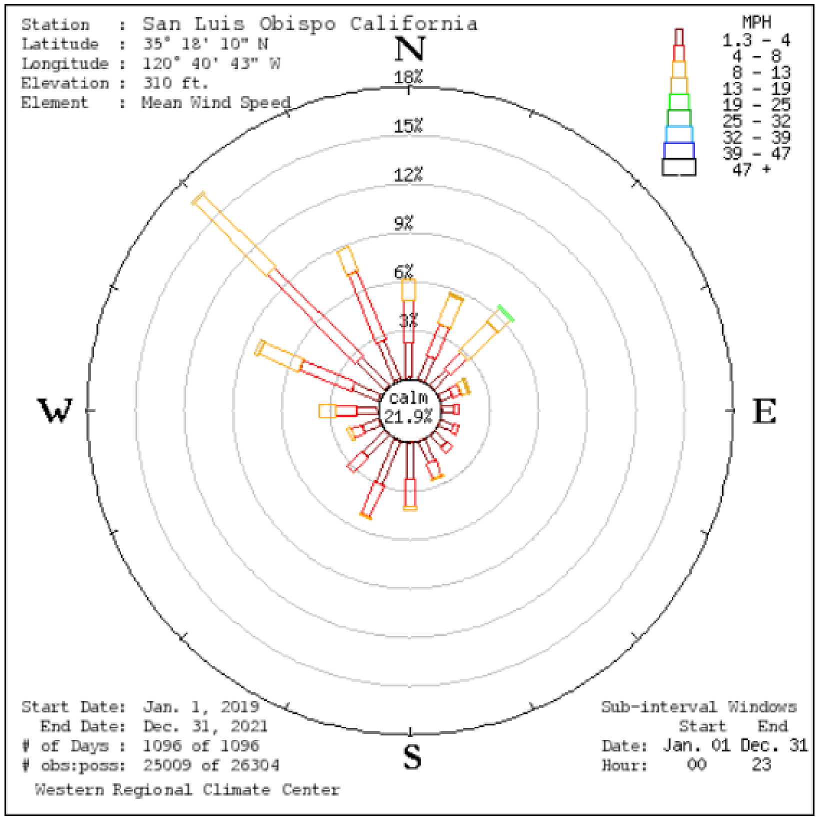
Air quality is defined by the concentration of pollutants, including greenhouse gasses (GHGs), in the ambient atmosphere. Pollutant concentrations are determined by a variety of factors, including the quantity and timing of pollutants released by emitting sources, atmospheric conditions such as wind 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-relate 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
Longitude : 120° 40' 43" W
Elevation : 310 ft.
Element : Mean Wind Speed

Start Date : Jan. 1, 2019
End Date : Dec. 31, 2021
# of Days : 1096 of 1096
obs : poss : 25009 of 26304

Sub Interval Windows
Start End
Date Jan. 01 Dec. 31
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 (NO_2), sulfur dioxide (SO_2), 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	• Stack emissions • Fugitive emissions[1] • Fuel and lubricant spills	CO, NO_2, $PM_{2.5}$, SO_2, marine diesel, lube oils, greenhouse gases
Auxiliary engines	• 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	• Stack emissions • Fugitive emissions • Fuel and lubricant spills	CO, NOx, $PM_{2.5}$, SO_2, marine diesel, lube oils, greenhouse gases
Trucks and locomotives	• Engine exhaust	CO, NOx, and $PM_{2.5}$, SO_2, greenhouse gases
Goods-movement equipment	• Engine exhaust	CO, NOx, and $PM_{2.5}$, SO_2, greenhouse gases

Notes: NOx = 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). NOx 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 (NOx), and fine particulate matter ($PM_{2.5}$), oxides of sulfur (SOx) 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, NOx, 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, NOx, 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, NOx, $PM_{2.5}$, SOx, 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, NOx, $PM_{2.5}$, SOx, 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	NOx	VOCs	PM_{10}	$PM_{2.5}$	SOx	CO_2	N_20	CH_4	CO_2e
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 sources[2]	**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 NOX = nitrogen oxides VOCs = volatile organic compounds
PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less
$PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less
SOx = sulfur oxides CO_2 = carbon dioxide N_2O = nitrous oxide CH_4 = methane
CO_2e = 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 10m^2 (108 ft^2) 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 decommission 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 discus-shaped buoys have a footprint of about 0.55 m^2 (6 ft^2) 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 incorpated 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 sumarized below. The Pacific Fishery Management Council (PFMC) classifies all of the regional habitats as essential fish habtiat 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). Interpretted seafloor features (geoforms) and associated groups of biological communities were collected from remote sensing and ROV surveys (Kuhz 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 infreqent 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 (Kuhnz 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 (Kuhnz et al., 2021). Special habitats in the region include bacterial mats, submarine canyons, and pockmark fields (Marsaglia et al., 2019; Kuhnz et al., 2021; Walton et al., 2021). No chemosynthetic communities were obseved in the WEA (Kuhnz et al. 2021).

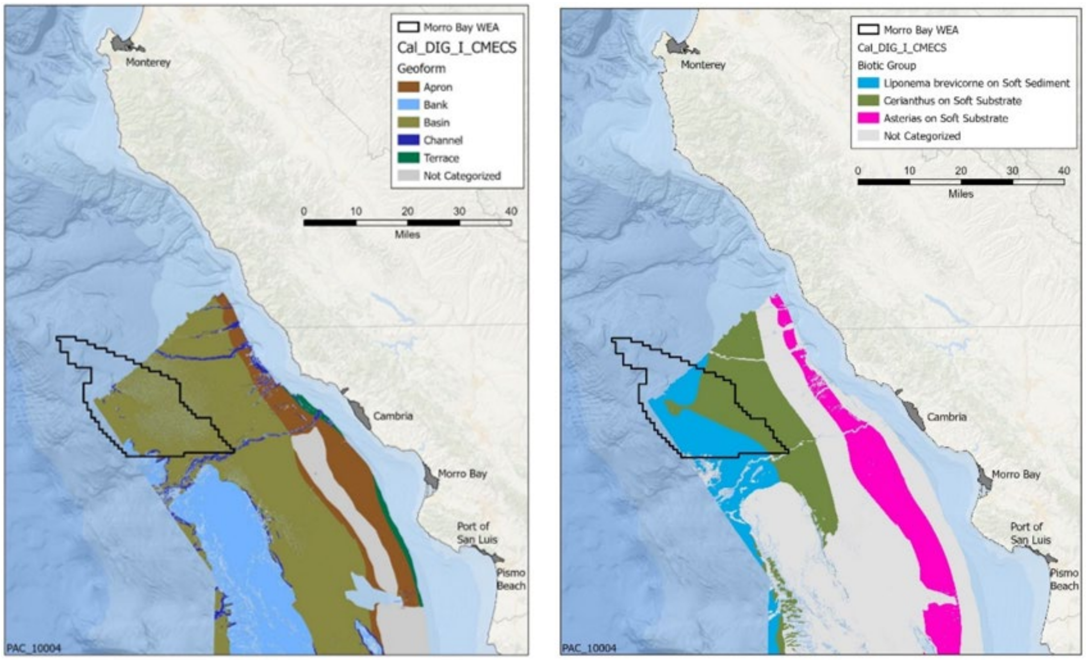


Figure 3-5: Seafloor Features (Geoforms, left) and Statistically Distinct Biological-based Soft Sediment Habitats (Biotic Group, right) Offshore Central California

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 terriestrial 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	*Haliotis cracherodii*	Endangered
Green sturgeon, Southern DPS	*Acipenser medirostris*	Threatened
Steelhead	*Oncorhynchus mykiss*	
South-Central California Coast Steelhead		Endangered
Southern California DPS		Threatened
Tidewater goby	*Eucycloglobius newberryi*	Threatened

3.4.2 Impacts of the Proposed Action

A metocean buoy is estimated to disturb a maximum of 2.3 m^2 (25 ft^2) 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 km^2), 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 km^2 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 mi^2 (64,760 km^2) 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]	*Balaenoptera musculus*	Eastern North Pacific	Endangered/Depleted	Late summer and fall
Fin whale[3]	*Balaenoptera physalus*	California, Oregon, and Washington	Endangered/Depleted	Year round
Sei whale[3]	*Balaenoptera borealis*	Eastern North Pacific	Endangered/Depleted	Uncommon
Minke whale[3]	*Balaenoptera acutorostrata*	California, Oregon, and Washington	-	Occasional
Humpback whale	*Megaptera novaeangliae*	California, Oregon, and Washington (Central American DPS and Mexico DPS)	Endangered/Threatened	Spring to fall
North Pacific Gray Whale[3]	*Eschrichtius robustus*	Eastern North Pacific	-	Oct-Jan and March-May

Toothed and Beaked Whales

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

Sea Lions and Seals

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

Sea Turtles

Common name	Scientific Name	Stock	ESA/MMPA Status	Occurrence
Leatherback sea turtle	*Dermochelys coriacea*	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).

<u>Potential for injury</u>: 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 µPa)	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 µPa)	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 µPa RMS for marine mammals and 175 dB re 1 µPa 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 nmi^2 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 nmi^2 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 nmi^2 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 (Chipley 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 (Chipley 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	*Branta bernicla*	-	SSC
Harlequin Duck	*Histrionicus histrionicus*	-	SSC
Black Oystercatcher	*Haematopus bachmani*	BCC	-
Mountain Plover	*Charadrius montanus*	BCC	SSC
Western Snowy Plover	*Charadrius nivosus nivosus*	T, BCC	SSC
Marbled Godwit	*Limosa fedoa*	BCC	-
Red Knot	*Calidris canutus*	BCC	-

Common Name	Scientific Name	Federal Status	State Status
Short-billed Dowitcher	*Limnodromus griseus*	BCC	-
Willet	*Tringa semipalmata*	BCC	-
Marbled Murrelet	*Brachyramphus marmoratus*	T	E
Scripps's Murrelet	*Synthliboramphus scrippsi*	-	T
Guadalupe Murrelet	*Synthliboramphus hypoleucus*	BCC	T
Craveri's Murrelet	*Synthliboramphus craveri*	BCC	-
Ancient Murrelet	*Synthliboramphus antiquus*	BCC	-
Cassin's Auklet	*Ptychoramphus aleuticus*	-	SSC
Rhinoceros Auklet	*Cerorhinca monocerata*	-	WL
Tufted Puffin	*Fratercula cirrhata*	-	SSC
Heermann's Gull	*Larus heermanni*	BCC	-
Western Gull	*Larus occidentalis*	BCC	-
California Gull	*Larus californicus*	-	WL
California Least Tern	*Sternula antillarum browni*	E	E, FP
Laysan Albatross	*Phoebastria immutabilis*	BCC	-
Black-footed Albatross	*Phoebastria nigripes*	BCC	-
Short-tailed Albatross	*Phoebastria albatrus*	E	SSC
Fork-tailed Storm-Petrel	*Hydrobates furcatus*	-	SSC
Ashy Storm-Petrel	*Hydrobates homochroa*	BCC	SSC
Black Storm-Petrel	*Hydrobates melania*	BCC	SSC
Murphy's Petrel	*Pterodroma ultima*	BCC	-
Hawaiian Petrel	*Pterodroma sandwichensis*	E	-
Cook's Petrel	*Pterodroma cookii*	BCC	-
Buller's Shearwater	*Ardenna bulleri*	BCC	-
Pink-footed Shearwater	*Ardenna creatopus*	BCC	-
Black-vented Shearwater	*Puffinus opisthomelas*	BCC	-
Brandt's Cormorant	*Urile penicillatus*	BCC	-
Double-crested Cormorant	*Phalacrocorax auritus*	-	WL
Brown Pelican	*Pelecanus occidentalis*	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 µPa 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 (Efroymson 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, (Efroymson 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 alcids, 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 (Form CG-2554: https://www.dcms.uscg.mil/forms/smdsearch4081/2554/).
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/bblretrv/.
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 (Lacoeuilhe 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
All other species	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
All other species	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
All other species	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
All other species	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 km^2 (0.303 mi^2) 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 Angles, 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=0604000079&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

			Ocean Economy Subsectors			
Area	**% of Total Economy**	**Employment**	**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/#/wages/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 (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and PM. Greenhouse gases are also produced, primarily in the form of carbon dioxide (CO_2). 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 tiłhini – 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 (Laverty 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 tiłhini – 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 (Corderro 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:

Name	Role in NEPA Process
Meghan Cornelison	Tribes and Tribal Resources
Desray Reeb	Marine Mammals and Sea Turtles
Susan Zaleski	Marine and Coastal Habitats and Associated Biotic Assemblages
David Pereksta	Coastal and Marine Birds
Donna Schroeder	Commercial Fishing
Tim Harper	Socioeconomics
Robert Dame	Geology
Pamela Grefsrud	Water Quality
Katsumi Keeler	Air Quality, Environmental Justice
Melanie Hunter	NEPA Coordinator
Lisa Gilbane	Project Supervisor
Shannon Vivian	Technical Writer/Editor

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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

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).