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## STAFF REPORT: REGULAR CALENDAR

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| **Consistency Determination No.:** | **CD-0001-22** |
| **Applicant:** | **Bureau of Ocean Energy Management** |
| **Location:** | In federal waters offshore of Humboldt County, approximately 20 miles off Eureka |
| **Project Description:** | Conduct a lease sale for up to 132,369 acres of federal waters for the future development of offshore wind energy facilities. Permit lessees to conduct site characterization and assessment activities and submit a construction and operations plan for development of offshore wind energy on their leases. |
| **Staff Recommendation:** | Conditional Concurrence. |

## SUMMARY OF STAFF RECOMMENDATION

The Bureau of Ocean Energy Management (BOEM) seeks the Commission's concurrence that proposed leasing and lease activities within the Humboldt Wind Energy Area (Humboldt WEA, or WEA), located approximately 20 miles off Eureka, is consistent with California's Coastal Management Program (CCMP). The CCMP consists of the enforceable policies of Chapter 3 of the Coastal Act (Cal. Pub. Res. Code §§ 30200-30265.5). BOEM anticipates issuing up to three leases, covering up to 132,369 acres, as part of the Humboldt WEA lease sale. BOEM's leases would allow lessees to perform geophysical, geotechnical, and biological surveys and would permit site assessment activities, including the temporary placement of up to three metocean buoys and oceanographic devices. After BOEM's lessees complete surveys and site assessment activities, the lessees would submit a construction and operations plan (COP) to develop a lease. The submission of a COP starts the federal environmental review process for specific wind development projects and would require BOEM's lessees to receive consistency certifications from the Commission prior to any further development being approved by BOEM.

The proposed lease sale is the culmination of many years of work by BOEM, as well as other federal and state agencies, to develop offshore wind resources in California. The state of California has set aggressive goals to reduce greenhouse gas emissions, move to clean energy sources, and achieve carbon neutrality as soon as possible, but no later than 2045. California will need to roughly triple its current electric power capacity to meet the 2045 target for clean energy, and the California Energy Commission has modeled scenarios that involve producing up to 10 gigawatts of energy from offshore wind. Likewise, the federal government has set a goal to deploy 30 gigawatts of offshore wind in the United States by 2030 and has been working hard to develop those wind resources quickly, while still protecting coastal uses and resources. On the U.S. east coast, there are currently two operating offshore wind farms, one more that is fully permitted, and fifteen additional projects that have reached the permitting phase. This is the first proposed lease of an offshore wind energy area on the west coast.

The federal Energy Policy Act of 2005 set up the legal framework under which BOEM analyzes potential wind energy areas, conducts planning, leases sites, and oversees the site assessment and construction and operation of commercial wind facilities. Pursuant to its authority under that law, in 2016 BOEM established a Renewable Energy Task Force with California to facilitate coordination among federal agencies and affected state, local, and tribal governments throughout the offshore wind leasing process. Following the first Task Force meeting, BOEM and the state, led by the California Energy Commission, engaged in a collaborative, data-based offshore wind energy planning process to foster coordinated and informed decisions about California's ocean resources. In addition to participating with the Task Force, Commission staff also participate in a state interagency working group to coordinate the state's regulatory, research, and planning work on offshore wind. Other agencies participating in the working group include the Energy Commission, Ocean Protection Council, Department of Fish & Wildlife, Public Utilities Commission, State Lands Commission, Governor's Office of Planning and Research, and Department of Parks & Recreation. This working group provided joint comments to BOEM on that agency's environmental review and

overall process and has also coordinated on outreach to Tribes and fishing communities. Although numerous other state agencies have been involved and have an interest in the offshore wind leasing and development process, the Coastal Commission is the only state agency with authority to review activities that occur more than 3 nautical miles offshore in federal waters.

**Scope of Federal Consistency Review**

BOEM's current consistency determination (CD) describes the activities related to lease assessment and exploration activities but does not describe or consider potential effects related to future construction and operation of any commercial wind power facilities. BOEM considers the impacts from any actual construction and operation activities to be too speculative to analyze at this time, given that the location, layout, and other design parameters of any future projects are currently unknown, and that environmental effects of the projects will depend in part on factors such as turbine size, foundation type, project layout, installation methods, mooring lines, and location and type of associated onshore facilities.

The Commission agrees that a primary focus for this CD is to analyze effects of lease exploration activities—such as site characterization and assessment—and that it is not possible at this time to analyze the precise effects that future construction and operation of offshore wind projects will have on coastal resources. However, it is reasonably foreseeable that the leases will lead to construction and operation of at least some offshore wind facilities. It is also feasible to describe, at least at a high level, the types of impacts that such facilities could have on coastal resources. Review of this consistency determination is the state's opportunity to examine the impacts of offshore wind development at a programmatic level and to assess whether the Humboldt WEA is an appropriate place to site offshore wind in California. This review also presents the opportunity to identify data and information needs for future federal consistency reviews of specific projects and to communicate the Commission's expectations on the anticipated scope of those future reviews. Therefore, throughout this report, lease exploration activities are analyzed for consistency with the CCMP, and future lease development activities are separately described and, to the extent that potential effects are reasonably foreseeable, also analyzed for consistency.

**Lease Exploration and Development Activities**

The issuance of a lease provides lessees with the exclusive right to conduct studies in their lease areas and easement areas to inform the development of a site-specific COP. Site assessment may include a variety of activities such as installation of buoys with data collection equipment and implementation of different types of surveys. Site assessment may include the installation of up to three buoys outfitted with a variety of scientific sampling equipment. These buoys float on the ocean surface and are affixed to the ocean floor with an anchor. Buoys can be installed in about one day and require one maintenance trip per year. Site characterization activities would also likely include additional geophysical, geotechnical, biological, archaeological, and ocean use surveys. BOEM expects lessees would make up to 496 vessel trips in the WEA to complete their surveys over a three-year period. For comparison, non-fishing vessel traffic in the Humboldt WEA in 2017 was up to 55 vessel trips.

The leases will not permit actual development of wind energy structures or facilities, and lessees will only obtain the right to construct such facilities after submitting construction and operation plans to BOEM, obtaining the Coastal Commission's concurrence with those proposed activities, and obtaining BOEM approval of them. Future development associated with offshore wind projects will likely include floating wind turbines, mid-water suspended electrical cables linking the turbines and running to a substation, mooring cables and anchors attaching the turbines to the seafloor, and an electrical export cable running from the substation to shore. There are four main types of floating platform, and each type of platform is stabilized by at least three mooring lines anchored to the seabed. There are also three primary types of mooring systems, some of which are primarily used on certain types of platforms, and four primary anchor technologies for securing the mooring lines to the seabed, which are selected depending on the composition of the sediment.

In addition to the mooring lines, an array of electrical cables, also known as inter-array cables, extend between multiple floating platforms and subsequently connect with terminal cables that lead to an electrical substation. Inter-array cables are suspended freely in the water column and are designed to compensate for the movement of the floating platform and the forces of the water column by using bend stiffeners, intermediate buoys, sinkers, or other devices. Although the exact size of future turbines in the Humboldt WEA is unknown, they are expected to be substantially larger than onshore turbines. A 15-megawatt turbine would be expected to have the following approximate dimensions: a hub height of 486 feet, a rotor diameter of 807 feet and a maximum height at the blade tip of 889 feet. If turbines of this size were installed in the Humboldt WEA, they would likely have a distance between turbines of 0.917-1.22 miles.

As part of offshore wind development, onshore facilities would be needed for the cable landing, and the location and cable landing infrastructure would need to be resilient to sea level rise. With this industry beginning on the West Coast, onshore facilities would also be needed for offshore wind turbine manufacturing and maintenance in West Coast ports and harbors.

Offshore wind turbines would be expected to have a service life of approximately 20 years, with blades needing repair every 2-5 years on average. Due to wave pressure, floating offshore wind turbines require heavier maintenance than onshore wind turbines. Approximately every 10 years, the entire system would need to be disconnected and towed to shore for repairs, followed by reinstallation.

**Coastal Effects of Proposed Activities**

The key Coastal Act issues raised by BOEM's proposed lease sale in the Humboldt WEA and reasonably foreseeable future activities are the potential for adverse impacts to marine resources, commercial and recreational fishing, environmental justice communities and Tribal and cultural resources. Lease activities have the potential to adversely affect marine resources through seafloor habitat disturbance and increasing turbidity, elevated levels of underwater sound during surveys, increased risk of ship strikes due to increased vessel traffic, and incrementally increased entanglement risk due to the placement of buoys. Future lease development has the potential to adversely affect marine resources through seafloor disturbance, turbine strikes, increased

entanglement risk, marine species displacement, avoidance or attraction, increased ship strike risk, elevated levels of underwater sound, fish aggregation and the artificial reef effect, invasive species, weakened upwelling, and electromagnetic fields. To minimize effects to marine resources, the staff recommends that the Commission adopt **Conditions 1, 2, and 3** to protect marine habitats and sensitive species. **Condition 1** requires BOEM to work with Coastal Commission staff to ensure that lessees' survey and sampling and analysis plans are coordinated, consistent, minimize impacts to coastal resources, and provide the data and information necessary for analysis of future consistency certifications. **Condition 1** also requires lessees to comply with marine wildlife protection and monitoring measures, to prepare a site-specific spill prevention and response plan and a critical operations and curtailment plan, and to provide an anchoring plan. **Condition 2** requires avoidance of intentional contact with hard substrate, rock outcroppings, seamounts or deep-sea coral/sponge habitat. **Condition 3** requires a vessel speed restriction for survey activities, including transit, of no more than 10 knots.

Lease activities and future offshore wind development also have the potential to adversely affect fishing and fishermen through exclusion and displacement from fishing grounds, increase costs and time at sea to reach new fishing grounds, loss of future fishing grounds and loss or disruption of harbor space and fishing infrastructure at ports. To minimize adverse impacts to commercial and recreational fishing, the staff recommends that the Commission adopt **Conditions 4 and 7**. **Condition 4** requires BOEM to ensure safe navigation through the lease areas. **Condition 7** requires lessees to have an independent fisheries liaison that coordinates with the fishing community to ensure surveys and site assessment activities avoid conflicts with fisheries, and requires BOEM to work with state agencies, fishermen and offshore wind developers to develop a statewide strategy for avoidance, minimization and mitigation of impacts to fishing and fisheries.

Lease exploration and development has the potential to adversely affect certain communities in the Humboldt area in a disproportionate way. In particular, environmental justice communities could experience impacts from disproportionate exposure to environmental changes due to port facilities development in Humboldt Bay (e.g. air emissions, noise, reduced public access). Further, California Native American Tribes could be affected by impacts to culturally important places, species, and traditional marine fishing practices. Early and ongoing engagement is critical to avoid impacts, minimize those that cannot be avoided and ensure that disproportionately affected communities benefit from future lease development. To minimize potential adverse effects to environmental justice communities, staff recommends that the Commission adopt **Condition 5**, which requires engagement with environmental justice communities on all elements of the lessees' project development processes including a workforce plan, survey and Site Assessment Plans (SAPs), and COPs. To minimize adverse effects to California Native American Tribes and cultural resources, the staff recommends that the Commission adopt **Condition 6**, which requires engagement with federally recognized and non-federally recognized California Native American Tribes on all elements of the lessees' project development process including a workforce plan, survey and SAPs, and COPs. This includes developing communication protocols in the event of an unanticipated discovery of a potential tribal resource.

In addition to the issues raised above, offshore wind lease exploration activities and future development of lease areas raise potential Coastal Act concerns related to coastal hazards, scenic and visual resources, public access and recreation, air quality and fill of coastal waters. Each of these issues is addressed in more detail in the staff report and will require more in-depth analysis when the Commission reviews specific offshore wind projects in the future.

With **Conditions 1 through 7** included, staff recommends that the Commission find BOEM's proposed activities fully consistent with the CCMP.

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# I. FEDERAL AGENCY'S CONSISTENCY DETERMINATION

The Bureau of Ocean Energy Management has determined that the project is consistent to the maximum extent practicable with the California Coastal Management Program (CCMP).

# II. MOTION AND RESOLUTION

**Motion:**

*I move that the Commission **conditionally concur** with Consistency Determination CD-0001-22 on the grounds that, if modified in accordance with the conditions recommended by staff, the project described therein would be fully consistent, and thus consistent to the maximum extent practicable, with the enforceable policies of the CCMP.*

**Staff Recommendation:**

Staff recommends a YES vote on the motion. Passage of this motion will result in a concurrence with the determination of consistency, provided the project is modified in accordance with the recommended condition(s), and adoption of the following resolution and findings. An affirmative vote of a majority of the Commissioners present is required to pass the motion.

**Resolution:**

*The Commission hereby **conditionally concurs** with Consistency Determination CD-0001-22 on the grounds that, the project is fully consistent, and thus consistent to the maximum extent practicable, with the enforceable policies of the CCMP, provided that BOEM agrees to modify the project consistent with the recommended conditions, as provided for in 15 CFR §930.4.*

**Conditions:**

1. **Plan Review and Coordination:** BOEM will work with Coastal Commission staff to ensure lessees' survey and sampling and analysis plans are coordinated, consistent, minimize impacts to coastal resources and provide the data and information necessary for analysis of future consistency certifications, as appropriate. As part of this effort, BOEM will:
    a. Encourage continuous and open communication and dialogue between BOEM, the lessees, the Coastal Commission and other relevant state agency staff during BOEM's review of survey plans, and sampling and analysis plans.

b. BOEM will coordinate with the Coastal Commission and other relevant state agencies to provide access to lessees' survey plan submissions, to the extent feasible.

c. BOEM will encourage lessees to collaborate on their survey plans to the maximum extent feasible to increase efficiency and minimize impacts of geophysical and other surveys conducted during the site assessment phase.

d. Per federal regulation 30 CFR 585.113, documents and data resulting from research, surveys and other data collection efforts conducted during the leasing phase by lessees that are subject to the Freedom of Information Act will be publicly available to the maximum extent feasible upon submittal to BOEM.

e. BOEM will require that lessees use low-energy equipment, as defined by California State Regulation 2 CCR sec. 2100.03 (g), to complete their geophysical surveys. Low-energy equipment is limited to subbottom profilers (e.g., mini-sparkers, boomers, chirp, and general subbottom profiler systems), echosounders (e.g., single beam and multibeam echosounders), and side-scan sonars. BOEM will encourage lessees to use geophysical survey operators that conduct their surveys consistent with the provisions of the California State Lands Commission's low-energy geophysical survey program.

f. In addition to the requirements described in the EA, BOEM will require lessees to include the following measures as part of any survey. If future consultation with NMFS, USFWS or other state or federal agency results in new requirements on the topics included below, BOEM will work with Commission staff to ensure that any new requirements remain consistent and do not diminish the level of resource protection provided by the measures below:

    i. Marine Wildlife Protection and Monitoring Measures: The Lessee shall implement all Marine Wildlife and Protection measures listed below during all marine operations (e.g., surveys, buoy installation and removal), consistent with vessel and worker safety:

        1. Prior to the start of offshore activities, the lessee shall provide awareness training to all Project-related personnel and vessel crew, including viewing of an applicable wildlife and fisheries training video, on the most common types of marine wildlife likely to be encountered in the Project area and the types of activities that have the most potential for affecting the animals.

        2. A minimum of one qualified marine mammal observer shall be located on each vessel to conduct observations. The number of observers per vessel will be sufficient to ensure complete viewing coverage of the surrounding marine

environment.

3. The observers shall have the appropriate safety and monitoring equipment adequate to conduct their activities (including night-vision equipment for nighttime survey operations).
4. The observers shall have the authority to stop any activity that could result in harm to a marine mammal or sea turtle, except under extraordinary circumstances when complying with this requirement would put the safety of the vessel or crew at risk. In the event that a whale comes in contact with a vessel or survey equipment or becomes entangled in any cable or lines, the observer shall immediately notify NMFS so appropriate response measures can be implemented. Similarly, if any harassment or harm to a marine mammal occurs, the observer shall immediately notify NMFS and any other required regulatory agency.
5. A final report summarizing the results of monitoring activities will be submitted to BOEM and a copy also sent to the Coastal Commission's Executive Director and other appropriate agencies no more than 90 days following completion of survey activities. The report shall include: (a) an evaluation of the effectiveness of monitoring protocols and (b) reporting of: (i) marine mammal, sea turtle, and other wildlife sightings (species and numbers); (ii) any wildlife behavioral changes; and (iii) any project delays or cessation of operations due to the presence in the project area of marine wildlife species subject to protection.

ii. Site-specific Spill Prevention and Response Plan: The lessee shall submit a site-specific Spill Prevention and Response Plan a minimum of 30 days before commencement of any in-water survey activities or as part of any survey or site assessment plan (SAP). The Plan shall be kept on the appropriate survey vessels during all survey and SAP operations. The Plan shall identify the worst-case spill scenario and demonstrate that adequate spill response equipment will be available. The Plan also shall include preventative measures the lessee will implement to avoid spills and clearly identify responsibilities of onshore and offshore contractors and the lessee's personnel and shall list and identify the location of oil spill response equipment (including booms), appropriate protocols and response times for deployment. Petroleum-fueled equipment on the main deck of all vessels shall have drip pans or other means of collecting dripped petroleum, which shall be collected and treated with onboard equipment.

iii. Critical Operations and Curtailment Plan (COCP): The lessee shall

include a COCP as part of any survey plan. The COCP shall define the limiting conditions of sea state, wind, or any other weather conditions that exceed the safe operation of offshore vessels, equipment, or divers in the water; that hinder potential spill cleanup; or in any way pose a threat to personnel or the safety of the environment. The COCP shall provide for a minimum ongoing five-day advance favorable weather forecast during offshore operations. The plan shall also identify the onsite person with authority to determine critical conditions and suspend work operations when needed. The Plan shall be kept on the appropriate survey vessels during all survey and SAP operations.

iv. Anchoring Plan: The lessee shall submit an Anchoring Plan to BOEM as part of any survey plan that requires vessel anchoring. The Plan describes how the lessee will avoid placing anchors on sensitive ocean floor habitats and pipelines and shall include the following information:
    1. A list of all vessels that will anchor during survey activities and the number and size of anchors to be set;
    2. Detailed maps showing proposed anchoring sites that are located at least 40 feet (12 meters) from hard substrate;
    3. A description of the navigation equipment that would be used to ensure anchors are accurately set; and
    4. Anchor handling procedures that would be followed to prevent or minimize anchor dragging, such as placing and removing all anchors vertically.

2. **No bottom contact:** As part of BOEM's review of survey plans and activities, BOEM will ensure that lessees avoid intentional contact within hard substrate, rock outcroppings, seamounts, or deep-sea coral/sponge habitat and include a buffer that fully protects these habitats from bottom contact, including but not limited to anchoring, mooring, and sediment sampling.
3. **Minimizing the risk of vessel strikes:** BOEM will require vessels conducting lease characterization studies, surveys, metocean buoy installation, maintenance, or decommissioning or any other survey activities to travel at speeds no more than 10 knots during all related activities including vessel transit. If future consultation with NMFS, USFWS or other state or federal agency results in different vessel speed requirements, BOEM will work with Commission staff to ensure that any new requirements remain consistent and do not diminish the level of resource protection provided by this requirement.
4. **Safe Navigation:** BOEM will work with stakeholders including USCG, the fishing and maritime industries and state agencies to ensure safe navigation through the lease areas. Safe navigation may entail designation of transit corridors.
5. **Engagement with environmental justice and local communities:** BOEM will encourage lessees to conduct outreach with local affected communities—and in

particular to demonstrate long-term engagement with environmental justice communities, including but not limited to low-income communities and communities of color—on all elements of the lessees' project development process, including, but not limited to, a Workforce Plan, Survey and SAPs, and a construction and operations plan (COP). This engagement should be coordinated to the maximum extent practicable with other Lessees in the region to reduce the burden on communities. The Lessee is strongly encouraged to compensate members of environmental justice communities for their time participating in engagement activities and events. Development of any Engagement Plan should be conducted in coordination with communities and should include strategies to reach individuals with Limited English Proficiency who may be affected by future offshore wind development.

6. **Engagement with California Native American Tribes:** BOEM will encourage lessees to demonstrate engagement with federally recognized and non-federally recognized California Native American Tribes that could be affected by future development associated with a lease on all elements of the lessees' project development process, including, but not limited to, a Workforce Plan, Survey and SAPs, and a COP. More specifically, as part of any survey or SAP, lessees should work with Tribes to develop a protocol for communication directly with Tribes in the event of an unanticipated discovery of a potential tribal resource as well as a post-discovery process for evaluation of a discovery.

   Engagement with Tribes should be coordinated to the maximum extent practicable with other Lessees in the region to reduce the burden on Tribes. The Lessee is strongly encouraged to compensate members of Native American Tribes for their time participating in engagement activities and events. Development of any Engagement Plan should be conducted in coordination with Tribes.

7. **Impacts to Fishing and Fishing Communities:**

   a. BOEM will require lessees to have an independent fisheries liaison that is responsible for the coordination and communication of site activities with affected commercial and recreational fishing communities and harbor districts, including development and implementation of survey and sampling and analysis plans. The fishing liaison will work with fishing communities and the harbor districts to coordinate survey and other activities and to develop a process for reporting and remediating conflicts between mariners and survey vessels/equipment. Lessees and fishing communities (including harbor districts) may choose to develop a signed/formal agreement that can be amended to reflect subsequent analysis and discussion between the fishing industry (entity as described below) or harbor district and developers on mechanisms for addressing impacts to commercial fishing.

   b. BOEM will require lessees to submit reports on process, outreach, and outcomes of engagement with fishing communities and harbor districts and will provide copies of these reports to the Commission. All documents

and analysis will be made publicly available and readily accessible, to the maximum extent practicable.

c. BOEM will work with the Commission and other state and federal agencies to develop and facilitate a working group consisting of fishing organizations and representatives from different regions/ports of the state, representing different fisheries and gear types, and in both the commercial and recreational sectors, lessees and state and federal agency staff. The working group will develop a statewide strategy for avoidance, minimization and mitigation of impacts to fishing and fisheries that prioritizes fisheries productivity, viability, and long-term resilience. The strategy should include protocols for communication, best practices for surveys and data collection, a methodology for comprehensive socioeconomic analysis of direct and indirect impacts to fishing, a framework for compensatory mitigation for unavoidable impacts, and a Fishing Agreement template that memorializes the elements of the strategy. The strategy should include specific consideration for those fisheries that are disproportionately and/or directly affected by offshore wind development.

# III. APPLICABLE LEGAL AUTHORITIES

## A. STANDARD OF REVIEW

The federal Coastal Zone Management Act ("CZMA"), 16 U.S.C. §§ 1451-1464, requires that federal agency activities affecting coastal resources be "carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs." Id. at § 1456(c)(1)(A). The implementing regulations for the CZMA ("federal consistency regulations"), at 15 C.F.R. § 930.32(a)(1), define the phrase "consistent to the maximum extent practicable" to mean:

> *… fully consistent with the enforceable policies of management programs unless full consistency is prohibited by existing law applicable to the federal agency.*

This standard allows a federal activity that is not fully consistent with California's Coastal Management Program ("CCMP") to proceed, if full compliance with the CCMP would be "prohibited by existing law." In its consistency determination, the Bureau of Ocean Energy Management (BOEM) did not argue that full consistency is prohibited by existing law or provide any documentation to support a maximum extent practicable argument. Therefore, there is no basis to conclude that existing law applicable to the federal agency prohibits full consistency. Since BOEM has raised no issue of practicability, as so defined, the standard before the Commission is full consistency with the enforceable policies of the CCMP, which are the policies of Chapter 3 of the Coastal Act (Cal. Pub. Res. Code §§ 30200-30265.5).

The Coastal Commission has certified LCPs for the Humboldt County General Plan, the Trinidad LCP, and the McKinleyville LCP. In certifying these LCP's, the Coastal

Commission has incorporated them into California's Coastal Management Program, and the LCPs will provide guidance in applying the chapter 3 policies in the context of local circumstances.

## B. Federal Consistency

### Conditional Concurrences

The federal consistency regulations (15 CFR § 930.4) provide for conditional concurrences, as follows:

*(a) Federal agencies, … should cooperate with State agencies to develop conditions that, if agreed to during the State agency's consistency review period and included in a federal agency's final decision under Subpart C … would allow the State agency to concur with the federal action. If instead a State agency issues a conditional concurrence:*

> *(1) The State agency shall include in its concurrence letter the conditions which must be satisfied, an explanation of why the conditions are necessary to ensure consistency with specific enforceable policies of the management program, and an identification of the specific enforceable policies. The State agency's concurrence letter shall also inform the parties that if the requirements of paragraphs (a)(1) through (3) of the section are not met, then all parties shall treat the State agency's conditional concurrence letter as an objection pursuant to the applicable Subpart . . . ; and*
>
> *(2) The federal agency (for Subpart C) … shall modify the applicable plan [or] project proposal,…pursuant to the State agency's conditions. The federal agency … shall immediately notify the State agency if the State agency's conditions are not acceptable…; and*
>
> *(3) The federal agency…shall approve the amended application (with the State agency's conditions)…*

*(b) If the requirements of paragraphs (a)(1) through (3) of this section are not met, then all parties shall treat the State agency's conditional concurrence as an objection pursuant to the applicable Subpart.*

### Right of Appeal

Pursuant to subsection (a)(1) quoted in the prior section and Subpart H of the federal consistency regulations, within 30 days from receipt of notice of a Commission conditional concurrence to which BOEM does not agree, BOEM may request that the Secretary of Commerce override this objection. 15 CFR §§ 930.4(a)(1) & 930.125(a). In order to grant an override request, the Secretary must find that the proposed activity for which BOEM submitted a consistency certification is consistent with the objectives or purposes of the Coastal Zone Management Act, or is necessary in the interest of national security. A copy of the request and supporting information must be sent to the Commission and the U.S. Army Corps of Engineers. The Secretary may collect fees from BOEM for administering and processing its request.

### C. Federal Waters Excluded from the Coastal Zone

The Humboldt WEA, which is the proposed location for lease exploration activities and future offshore wind development, is located entirely within federal waters, approximately 21 miles off the coast of Eureka, in Humboldt County. Federal waters are considered excluded from the coastal zone under the Coastal Zone Management Act [16 U.S.C. §1453(1)]. In this instance, the Commission's review of activities in federal waters focuses on spillover effects on coastal resources within the coastal zone. This review may include effects that activities in federal waters may have on resources within the coastal zone, or effects that activities in federal waters may have on species in federal waters that travel in and out of the coastal zone. For example, the sound used to conduct geophysical surveys may travel from where the survey is being conducted in federal waters to the coastal zone and affect marine life within the coastal zone. Similarly, geophysical surveys could impact marine species that travel large distances and are known to move between the coastal zone and federal waters, such as marine mammals.

Thus, in its evaluation of this proposed lease sale's consistency with the Coastal Act, this Commission analyzes spillover effects on coastal resources beyond federal waters. Subsequent sections of this report examine project effects within this analytic framework.

## IV. FINDINGS AND DECLARATIONS

### A. Setting and Background

#### California's Renewable Energy and Climate Change Goals

California is experiencing the impacts of climate change at a rapid pace. Driven by anthropogenic activities and associated greenhouse gas emissions, California saw an average temperature increase of about 1.8 degrees Fahrenheit and an average sea level rise of about eight inches over the past century (California Natural Resources Agency, 2018). In just the past several years, the state has also suffered its largest wildfires in recorded history, severe drought coinciding with record low snowpack, and increasingly frequent heat waves and major storm events (Office of Environmental Health Hazard Assessment and California Environmental Protection Agency, 2018). These many manifestations of climate change are already causing far-reaching impacts on California's residents, resources, economy, and infrastructure, and are only expected to worsen in the coming decades. Projections indicate that in the next 30 years, sea levels will rise as much as they did over the past 100 years and damaging flood events will occur over ten times more frequently than they do today (Sweet, et al., 2022).

In the Humboldt area specifically, climate change is causing notable transformation. Due to significant land subsidence in Humboldt Bay, sea levels are rising at two to three times the statewide average rate. This could result in frequent overtopping of the bay's diked shorelines with only 3 feet of sea level rise, which is likely to occur by the end of the century and would cause significant impacts to the region's low-lying agricultural and residential areas, highway and communication infrastructure, and water and

wastewater systems (Humboldt State University, 2018). Average annual temperatures are also expected to climb by five to nine degrees Fahrenheit in the Humboldt area by the end of the century, which will extend the length of fire season and deliver more intense storms within a shorter wet season. Ecosystem impacts have already been observed for cold-water species such as salmon and trout, which are highly vulnerable to changes in water temperatures and prolonged periods of drought (Grantham, 2018). The anticipated increase in wildfire events and shifts in coastal species distributions will have untold effects on the area's biodiversity, timber and fishing industries, and ecosystem services.

To combat the adverse effects of climate change in the coastal zone, the Commission oversees and supports multiple adaptation efforts across the state. For instance, to date the Commission has awarded over $11.5 million to local governments through its Local Assistance Grant Program to fund LCP updates focused on sea level rise and climate resiliency; has produced multiple guidance documents with policy direction for local governments on sea level rise planning and adaptation; and has reviewed and approved Public Works Plans for several coastal counties that take a comprehensive approach to wildfire resiliency and forest management. These adaptation efforts are critical to facing current and projected climate change impacts. However, absent significant and immediate reductions in global greenhouse gas emissions, the impacts of climate change are only expected to continue and accelerate.

California is an international leader in policies to mitigate the impacts of climate change through reducing greenhouse gas emissions and expanding the use of renewable energy to generate electricity. In 2006, the state passed the Global Warming Solutions Act, which required a reduction in greenhouse gas emissions to the 1990 level by 2020 (Nunez, Chapter 488, Statutes of 2006). The current target, set by Senate Bill 32 is 40 percent below the 1990 level by 2030 (Pavley, Chapter 249, Statutes of 2016).

California also has a goal to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter (Exec. Order No. B-55-18, 2018). In 2021, Governor Newsom requested the California Air Resources Board to evaluate achieving carbon neutrality by 2035.[1] California is taking bold action to meet these greenhouse gas reduction targets. For example:

- The California Energy Commission's (CEC's) Building Energy Efficiency Standards for 2022 requires commercial buildings and new high-rise multifamily buildings to include photovoltaic solar and battery energy storage.
- Governor Newsom issued executive order N-79-20 in 2020, which established a goal for all sales of new passenger vehicles in California to be zero-emission vehicles by 2035. With the passage of Senate Bill 100 (De León, Chapter 312, Statutes of 2018), California established a landmark policy, requiring renewable energy and zero-carbon sources to supply 100 percent of the state's electric retail sales to ends-use customers by 2045. California will need to roughly triple its current electric power capacity to meet the 2045 target. The report includes energy scenarios modeling 10 gigawatts of offshore wind coming online by 2045

[1] https://www.gov.ca.gov/wp-content/uploads/2021/07/CARB-Letter_07.09.2021.pdf.

to meet this goal (California Energy Commission et al., 2021).

The offshore wind energy generation profile can be complementary to solar energy. On average, offshore wind continues to generate electricity as solar generation drops off in the evening (Optis et al., 2020). Including offshore wind in the state's energy portfolio may help California reduce the use of gas-fired power plants in the evening hours during net peak demand (California Energy Commission, 2021).

Recognizing that California offshore wind energy can advance progress toward achieving California's statutory renewable energy and climate mandates, Assembly Bill 525 (Chiu, Chapter 231, Statutes of 2021) requires the CEC to evaluate and quantify the maximum feasible capacity of offshore wind to achieve reliability, ratepayer, employment, and decarbonization benefits and establish megawatt offshore wind planning goals for 2030 and 2045. The CEC's work for AB 525 includes an offshore wind strategic plan that:

- Identifies suitable sea space for wind energy areas in federal waters that will accommodate the state's offshore wind planning goals.
- Outlines economic and workforce development needs and identifies port space and infrastructure needs, as well as a plan to improve waterfront facilities that could support a range of floating offshore wind energy development activities.
- Identifies transmission investments and upgrades necessary, including potential subsea transmission options, to support the state's offshore wind planning goals.
- Provides a permitting roadmap.
- Identifies potential impacts on coastal resources, fisheries, Native American and Indigenous peoples, and national defense, and strategies for addressing those potential impacts.

Transitioning to 100% renewable energy is a necessary step to slow the pace of climate change. However, it is critical that this transition be done in a way that protects California's invaluable coastal and marine resources. As California considers how to approach offshore wind development, careful planning and comprehensive examination of potential impacts, and a commitment to adaptive management are central to ensuring coastal resource protection. The efforts made to understand, avoid, and minimize impacts now will also help inform future floating wind project design.

### Status of Offshore Wind Globally and Nationally

The first offshore wind farm was constructed in Denmark in 1991. Europe has continued to be a global leader in offshore wind ever since, with approximately 2,300 offshore wind turbines active today (WindEurope, 2021). As of 2020, there were 35,500 cumulative megawatts of offshore wind power installed globally (Global Wind Energy Council, 2021). The United Kingdom, China, and Germany are leaders in this effort. China is also developing offshore wind and has set ambitious targets for development in its waters.

Today, the United States has two operating offshore wind projects: the Block Island Wind Farm in Rhode Island and the Coastal Virginia Offshore Wind pilot project in

Virginia (Office of Energy Efficiency and Renewable Energy, 2021a). Beyond these two projects, the Vineyard Wind 1 project, located in federal waters off Massachusetts, is fully approved. There are 15 additional projects on the east coast that have reached the permitting phase. BOEM has designated seven wind energy areas that may be leased at their discretion in the future.

Most of the offshore wind development in the world and in the United States today is on fixed-bottom foundations. These foundations are only feasible in shallow waters of up to 200 feet in depth, which is part of why development of offshore wind in the U.S. has focused on the shallow waters of the east coast until recently. On the West Coast of the U.S., the continental shelf drops off from the coastline relatively quickly, making fixed-foundation turbines technically infeasible in most federal waters. However, the West Coast has excellent offshore wind resources. Manufacturers and developers have been innovating floating foundations for offshore wind turbines to enable them to access wind resources in deeper waters. The first floating offshore wind turbine was installed in Italy in 2007. Globally, there have only been 18 floating offshore wind turbines, one of which was in Maine. Of these 18 turbines, only 11 are currently active (Maxwell, et al., 2022). More discussion on floating foundation types is in Section B of this report.

As offshore wind technology has matured, the size and generating capacity of offshore wind turbines has increased substantially (Office of Energy Efficiency and Renewable Energy, 2021). In 2009, offshore wind turbines in Europe had capacities of roughly 3 megawatts (MW). In 2021 three major turbine manufacturers announced the development of offshore wind turbines ranging from 12-15 MW and these turbines will be available for purchase by 2024 or sooner. Offshore wind turbines are typically much larger than land-based turbines. In 2020, the average land-based turbine has a capacity of 3 MW and a rotor diameter of 410 feet. Turbines located at California's Altamont Pass range from 100kW to 2MW. The 15 MW offshore turbines being designed now have a rotor diameter of 787 feet (Bredmose, 2020). Offshore wind is historically known for being more expensive than onshore wind turbines, though this is changing over time with efforts to make offshore wind more cost-efficient.

### BOEM's Offshore Wind Leasing Process

In California, most offshore wind development would likely occur in federal waters. BOEM is the federal agency responsible for issuing leases, easements, and rights-of-way for renewable energy projects on the outer continental shelf (OCS) under the Energy Policy Act of 2005. BOEM's competitive commercial leasing process is divided into four phases: planning and analysis, leasing, site assessment, and construction and operations:

- **Planning and Analysis:** BOEM releases a call for information, public comment, and nominations for potential wind energy areas. BOEM then designates wind energy areas that appear to be most suitable for leasing.
- **Leasing:** The leasing phase includes the publication of a draft and final lease sale notice, which lays out the auction format, lease stipulations, and other lease requirements for developers. Prior to issuance of the final lease sale notice, BOEM conducts a National Environmental Policy Act (NEPA) review to assess

the environmental impacts of issuing leases. The issuance of a lease does not allow for the construction of any facilities; instead, it grants a developer the exclusive right to conduct site assessment activities and create a plan for the use of the area, which BOEM would then review and potentially approve.

- **Site Assessment:** After developers secure a lease, they engage in site characterization and assessment activities to inform the design of their proposed project. Within a year of securing a lease, developers must submit a site assessment plan (SAP) that describes the initial activities necessary to characterize a lease site. Developers then have up to five years to conduct the site characterization and assessment studies and surveys. The site assessment phase ends when the developer submits a construction and operations plan (COP) to BOEM for review.
- **Construction and Operations:** The COP describes the specific project the developer intends to construct and operate. When BOEM receives a COP, it conducts a NEPA review for the specific project under consideration. Once NEPA is complete, BOEM issues a record of decision describing its approval, conditional approval, or denial of the project, and any required modification or mitigation. If the project is approved, the developer moves forward with construction and operations after the record of decision is released.

There are two points in BOEM's process where offshore wind decisions come before the Commission for federal consistency review. The first is at the leasing phase of the process, where BOEM submits a consistency determination, the Commission analyzes the consistency of the lease sale and any related, reasonably foreseeable activities and effects with California's coastal program, and the Commission can concur, conditionally concur, or object to the lease sale. The second federal consistency review occurs at the construction and operations phase. At that stage, the Commission will review a consistency certification, submitted by each developer, covering the specific elements of a proposed offshore wind project. The Commission will be able to concur, conditionally concur, or object to each consistency certification submitted for a specific COP. Currently, BOEM has designated two wind energy areas (WEAs) in California: the Humboldt WEA and the Morro Bay WEA. BOEM intends to hold a lease sale for both WEAs in the fall of 2022 but so far has only submitted a consistency determination for lease activities at the Humboldt WEA, which is the subject of this review.

### B. Scope of Federal Consistency Review

BOEM seeks the Commission's concurrence that its proposed lease sale for the Humboldt WEA is consistent with California's Coastal Management Program. BOEM anticipates issuing up to three leases as part of the Humboldt lease sale. BOEM also anticipates issuing associated easements on the OCS outside of the Humboldt WEA for subsea cable corridors and areas for associated offshore collector/converter platforms. These easements would all be located within the northern California OCS, extending from the WEA through to federal and state waters and to the onshore energy grid.

BOEM's consistency determination (CD) and the Environmental Assessment it is required to complete under NEPA describes and analyzes the potential environmental

impacts related to this lease sale. Specifically, these documents describe and analyze site assessment and characterization activities on the lease areas and on related areas (e.g., potential easement areas). Site assessment activities would most likely include the temporary placement of meteorological buoys and oceanographic devices. Site characterization activities would most likely include geophysical, geotechnical, and biological surveys. The CD does not describe or consider potential effects related to future construction and operation of any commercial wind power facilities. BOEM considers the impacts from any such actual construction and operation activities to be too speculative to analyze at this time, given that the location, layout, and other design parameters of any future projects are unknown at this time and that environmental effects of the projects will depend in part on factors such as turbine size, foundation type, project layout, installation methods, mooring lines, and location and type of associated onshore facilities. BOEM also notes that the issuance of a lease only grants the lessee the exclusive right to submit to BOEM a SAP and COP proposing development of the leasehold; the lease does not, by itself, authorize any development within the lease area. BOEM will conduct future NEPA review for proposed lease development and construction activities if a lessee submits a COP. The applicant for a COP would also need to submit a consistency certification to the Coastal Commission before the COP could be approved. See 30 C.F.R. § 585.627 (requiring submittal of consistency certification as part of COP submittal to BOEM). The Commission would review more detailed, site-specific effects at that time.

The Commission concurs that a primary focus for this CD is to analyze effects of lease activities—such as site characterization and assessment—and that it is not possible at this time to analyze the precise effects that future construction and operation of offshore wind projects will have on coastal resources. However, issuance of leases will have immediate effects on fishing communities even before any lease development activities occur, as the leases and overall BOEM process injects uncertainty into an occupation that is already heavily regulated and uncertain. Based on past BOEM leases and authorizations for wind development on the east coast, it is also reasonably foreseeable that the leases will lead to construction and operation of at least some offshore wind facilities, and it is feasible to describe, at least at a high level, the types of impacts that such facilities could have on coastal resources. Review of this consistency determination is the state's opportunity to examine the impacts of offshore wind development at a programmatic level; to assess whether the Humboldt WEA is a suitable site for offshore wind in California and whether there are certain areas within the WEA that are more or less suited to future projects; to ensure that the leasing process will lead to the development of adequate baseline information that will be needed to analyze impacts of future, specific development projects; and to ensure that the leasing process will set up a framework that can be used to analyze and mitigate likely impacts of future wind projects. Future consistency certifications at the construction and operations phase will examine specific projects and their specific impacts, but they are not well-suited to address larger issues related to the Humboldt WEA (e.g., assessing the presence of a large feature in the WEA that needs protection, or forming an appropriate working group to study issues related to development of the WEA as a whole).

More detail on the lease exploration activities described by BOEM and other reasonably

foreseeable future lease development activities is included below. Because the leases will be in federal waters outside of the defined "coastal zone," the analysis of lease-related activities will focus on impacts those activities have on resources that travel between federal waters and California's coastal zone—such as marine mammals—or on impacts that may travel from federal waters to the coastal zone, such as underwater sound.

**Proposed Lease Area**

The Humboldt WEA is located approximately 21 miles offshore of the City of Eureka in Humboldt County (see **Exhibit 1-1**). The area is approximately 28 miles in length from north to south and approximately 14 miles in width from east to west. The entire area is approximately 206 square miles (132,369 acres or 533 square kilometers) in size. In identifying the Humboldt WEA, BOEM considered the technical criteria needed to ensure that offshore wind development was viable, including wind speeds, seafloor slope, and seafloor depth. In its consistency determination, BOEM states:

> *The Humboldt WEA meets key technical criteria generally used to determine the appropriateness of floating offshore wind energy development. The average estimated wind speed at 100 meters above sea level within the Humboldt WEA is 9.2 meters per second. This exceeds average wind speeds of several commercial developments in the North Sea in Europe. The water depths in the Humboldt WEA, which range from 500 to 1,100 meters, are technically feasible for several types of floating foundations. These water depths make pile-driven foundations (e.g., monopile or jacket) infeasible in any of the previously mentioned Call Areas. The Humboldt WEA is sufficiently close to existing transmission infrastructure to easily interconnect to the electrical grid.*

BOEM also investigated other uses of the area during the area identification process and found that potential wind development within the Humboldt WEA had the greatest potential to interact with or affect commercial and recreational fishing, avian species, marine mammals, vessel traffic, historic properties, visual resources, and military activities. In its CD, BOEM indicates that none of these factors weighed in favor of reducing the size of the WEA, therefore BOEM delineated the Humboldt WEA in its entirety. The considerations that went into identification of the Humboldt WEA are discussed in the Humboldt WEA ID Memo (BOEM, 2021).

Offshore wind projects cannot happen without adequate landside and port infrastructure. The Humboldt WEA was identified for potential wind development in part because there is adequate electrical transmission capacity nearby onshore, and there is also a deep-water marine terminal at the Humboldt Bay Harbor, Recreation, and Conservation District (Humboldt Harbor District) that can support the development and operation of offshore wind. With a range of 5.6 to 8.4 million megawatt-hours of energy production per year in the Humboldt WEA, it is likely that the Humboldt Harbor District will be heavily relied upon due to proximity to the WEA during construction, operations, and maintenance of leased wind farms. This will require significant port development in Humboldt. In the CD, BOEM notes that:

> *The Port [Humboldt Harbor District] is interested in the development, use, and occupancy of Redwood Marine Terminal I (http://humboldtbay.org/) to repurpose the area into a Multipurpose Marine Terminal to support proposed offshore wind energy development in the region.*

Port development-related projects and impacts are not defined at this time but may include pier construction for offshore wind turbine assembly, more frequent and deeper dredging to ensure vessel access to Humboldt Bay, and construction of additional port facilities to support the offshore wind industry. New use of the Humboldt Harbor District facilities has the potential to create competition for space with existing industries in Humboldt Bay, such as aquaculture and the fishing industry, but could also benefit the Humboldt Harbor District and the region by redeveloping unused industrial properties within the Humboldt Harbor District and creating new employment opportunities.

**Lease Exploration Activities**

The issuance of a lease provides lessees with the exclusive right to conduct studies in their lease areas and easement areas to inform the development of a site-specific COP. Site assessment may include a variety of activities such as installation of buoys with data collection equipment and implementation of different types of surveys. These activities will be described in more detail in a SAP or in individual survey plans prepared by the leaseholder and reviewed by BOEM after a lease is granted. However, the types of activities and impacts associated with those activities are described, assessed and authorized as part of BOEM's EA and the lease issuance process.

As described by BOEM, site assessment is likely to include the installation of up to three metocean or met buoys outfitted with a variety of scientific sampling equipment. Metocean buoys float on the surface and are affixed to the ocean floor with an anchor. Disc, boat-shaped, spar met buoys are most likely to be adapted for offshore wind data collection. The shape of the buoy and its intended location influence the specific mooring and anchoring design to be used. A spar buoy can be stabilized through an onboard ballasting mechanism approximately 60 feet below the water surface, with approximately 30-40 feet of the buoy above the water surface. Spar buoys use tension leg mooring systems. In contrast, boat-shaped buoys have been moored with a solid cast iron anchor weighing approximately 11,000 pounds with a 2.3 square meter (24.75 square feet) footprint. The mooring line for the boat-shaped buoy is comprised of a chain, jacketed wire, nylon rope, polypropylene rope, and subsurface floats to keep the mooring line taut to semi-taut. The mooring line is approximately 1,200 meters (4,261 feet) long.

Buoys can be installed in about one day and require one maintenance trip per year, BOEM anticipates up to three buoys being installed in the Humboldt WEA during the lease exploration phase. For installation, buoys would typically be towed or carried aboard a vessel to the installation location. Once at the location site, the buoy would either be lowered to the surface from the deck of the vessel or placed over the final location, and then the mooring anchor chain dropped. After installation, the transport vessel would likely remain in the area for several hours while technicians configure operations of all systems and equipment on the buoy. The types of vessels used to install these buoys in the past included an 84-foot research vessel with a Zodiac rigid-

hulled inflatable boat. Buoy decommissioning is also expected to take one day and would occur in year six or seven after lease execution. On-site inspections and preventative maintenance, such as addressing marine fouling, wear, or lens cleaning are expected to occur once a year. BOEM anticipates the total number of vessel trips for met buoy installation, maintenance, and decommissioning over a 5-year period to be around 21-30 vessel trips in the Humboldt WEA.

BOEM anticipates that most met buoys will power their instrumentation and telemetry systems using solar arrays, lithium or lead acid batteries, and diesel generators. If diesel generators are used, BOEM will require an onboard fuel storage container with appropriate spill protection and an environmentally sound method to perform refueling activities. BOEM did not provide an estimate for vessel trips required for potential refueling activities.

Site characterization activities would also likely include additional geophysical, geotechnical, biological, archaeological, and ocean use surveys. Table 1-1 below, which was included with BOEM's CD, outlines the survey equipment or methods used for each type of survey.

**Table 1-1. Types of Surveys, Equipment/Methods, and Resource Surveyed**

| 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, archaeological, bathymetric charting, benthic habitat |
| Geotechnical/ sub-bottom sampling | Vibra, piston, gravity cores, cone penetration tests | Geological |
| Biological | Grab sampling, benthic sled, underwater imagery/sediment profile imaging, Remotely Operated Vehicle (ROV), Autonomous Underwater Vehicle (AUV) | Benthic Habitats |
| | Aerial digital imaging, visual observation from boat or airplane, radar, thermal and acoustic monitoring | Avian |
| | Ultrasonic detectors installed on buoy and survey vessels used for other surveys, radar, thermal monitoring | Bats |
| | Aerial and/or vessel-based surveys and acoustic monitoring | Marine mammals and sea turtles |
| | Direct sampling using vessel-based surveys; underwater imagery; acoustic monitoring; environmental DNA | Fishes and some invertebrates |

BOEM expects a total of between 130-178 24-hour survey days or round trips would be needed for lessees to complete their surveys. Table 1-2 below from BOEM's EA provides a breakdown of anticipated vessel trips for the different types of surveys expected. For comparison, BOEM's EA shows that the highest amount of vessel traffic in the Humboldt WEA in 2017 was up to 55 vessel trips, when combining both cargo ships and tugs and tows.

**Table 1-2: Projected Maximum Vessel Trips for Site Characterization**

| 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 | 24–48 | 24–48 |
| Fish surveys | Once per day for the duration of the SAP | Once per day for the duration of the SAP |
| Marine mammal and sea turtle surveys | 24–48 | 24–48 |
| Total: | 130–178 | 448–496 |

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.

HRG = high-resolution geophysical

BOEM expects that lessees would survey their entire proposed lease area during the 5-year site assessment term, and that survey vessels would travel at a speed of 4.5 knots. For geophysical surveys, BOEM expects that lessees would not use air guns, and that the methods used for geophysical surveying would be limited to multibeam echosounders, magnometers, side-scan sonar, and shallow and medium seismic penetration sub-bottom profilers. These geophysical survey activities are expected to generate noise and will be discussed in greater detail in the marine resources section.

Finally, BOEM expects that lessees would stage their lease exploration activities from the Humboldt Harbor District. The closest alternative harbors would be Crescent City, which is approximately 90 miles to the north, Coos Bay, which is approximately 217 miles to the north, and San Francisco Bay, which is approximately 229 miles to the south.

### Lease Development Activities

Specific lease development projects are not being proposed at this time. On the East Coast, the timeframe between leasing and construction for the Vineyard Wind Project was six years. Floating offshore wind technologies that will be used in the Pacific are still being developed. However, there is a general sense of what these offshore wind projects will entail. Offshore wind projects are expected to include floating wind turbines, mid-water suspended electrical cables linking the turbines and running to a substation, mooring cables and anchors attaching the turbines to the seafloor, and an electrical export cable running from the substation to shore. Environmental assessments of floating offshore wind turbines are dependent in part on the type of platform, mooring, and anchor selected. Color, quantity, and the type of materials used will further vary assessment results.

Floating offshore wind turbines differ from fixed-foundation turbines in the type of platform and anchoring system used to support the turbine. Maxwell et al. (2022) provides a synthesis of floating offshore wind technologies and their potential environmental impacts. For a diagram of the different types of floating offshore wind turbines, moorings and anchors, please see **Exhibit 1-2**. There are four main types of

floating platform: barge, spar, tension leg platform, and semi-submersible platform. Each type has different efficiency levels. Each type of floating platform is stabilized by at least three mooring lines anchored to the seabed. For some mooring configurations, the mooring lines will experience some drift, resulting in each turbine also drifting within a certain radius of its station. The three primary types of mooring systems are catenary, taut, and semi-taut. Catenary mooring is most used with spar, semi-submersible, and barge platforms. The taut leg mooring system is most used with the tension leg platform. Semi-taut mooring systems are also used on semi-submersible platforms. The best anchor technology for securing the mooring lines to the seabed depends on the composition of the sediment. The four primary anchor types are drag-embedment, suction caissons, gravity anchor, and anchor piles. Suction caisson and gravity anchors are typically less impactful to benthic ecosystems as they do not drag as much on the seabed. Substantial innovation is ongoing in developing anchors for the offshore wind industry, particularly in deeper waters (Maxwell et al., 2022).

In addition to the mooring lines, an array of electrical cables, also known as inter-array cables, connects each of the turbines and transmit the generated electricity to shore. For a schematic of full scale floating offshore wind development, including inter-array cables and offshore substations, please see **Exhibit 1-3**. These inter-array cables extend between multiple floating platforms and subsequently connect with terminal cables that lead to an electrical substation. Inter-array cables are suspended freely in the water column and are designed to compensate for the movement of the floating platform and the forces of the water column by using bend stiffeners, intermediate buoys, sinkers, or other devices. The depth of the inter-array cables in the water column is determined by specific project design. In some cases, inter-array cables may be buried or weighted to the seafloor between the platforms. The inter-array cables potentially represent a sizeable physical and environmental footprint of future projects, as they must span the distance between turbines throughout the wind energy development. Typical spacing for offshore wind turbines is between six to eight times the diameter of the rotor (Maxwell et al., 2022). Although the specifics of future projects are unknown; a BOEM-funded visual simulation of turbines in the Humboldt WEA assumed that turbines would have a generating capacity of 15 MW, a hub height of 486 feet, a rotor diameter of 807 feet and a maximum height at the blade tip of 889 feet.[2] If turbines of this size were installed in the Humboldt WEA, they would likely have a distance between turbines of 0.917-1.22 miles.

Due to the location of the Humboldt WEA, substations for offshore wind projects would likely also be offshore, either floating or on the seafloor. A single cable route would export the electricity from the substation to shore. Onshore facilities would be needed for the cable landing, and the location and infrastructure would need to be resilient to sea level rise. As discussed above, onshore facilities will also be needed for turbine manufacturing and maintenance, and the Humboldt Harbor District has expressed interested in redeveloping Redwood Marine Terminal 1 for this purpose.

Offshore wind turbines are expected to have a service life of approximately 20 years, with blades needing repair every 2-5 years on average (Mishnaevsky and Thomsen,

[2] More information on this visual simulation may be found in the Scenic and Visual Resources section

2020). Due to wave pressure, floating offshore wind turbines require heavier maintenance than onshore wind turbines. Approximately every 10 years, the entire system would need to be disconnected and towed to shore for repairs, followed by reinstallation (Toulotte, 2021).

Monitoring and Adaptive Management

Floating offshore wind is a new industry to California but also worldwide. As a result, there is a great deal of uncertainty as to the specific impacts floating offshore wind turbines, and facilities in aggregate, will have on marine species and the surrounding physical environment. And although we can draw on data and information from other parts of the world and from similar industries in California, realistically, we will not be able to know the full scope and scale of impacts from offshore wind to California's marine resources until projects are in the water and we are able to monitor and measure the resulting effects. Thus, comprehensive monitoring and adaptive management plans for all offshore wind projects will be a critical in ensuring coastal resources are protected.

Over the next several years, before specific projects come before the Commission for review under the Coastal Zone Management Act (CZMA), the Commission expects that its staff will work collaboratively with BOEM and other federal and state partners as well as Tribal and non-governmental experts and industry representatives to review the relevant science on survey methodologies, monitoring approaches and technologies, adaptive management strategies and other relevant topics for floating offshore wind. This body of knowledge will inform baseline data collection and development (and regulatory review) of comprehensive monitoring plans for future offshore wind projects. A critical element of these comprehensive monitoring plans is data transparency and the sharing of baseline data collection with stakeholders and the interested public, so that decisions on how assess the impacts of specific proposed lease development projects during the COP phase are well-informed.

## C. CUMULATIVE CONTEXT: THE BIG PICTURE

The leasing and potential future development of the Humboldt WEA will have a variety of effects on coastal resources. Consistency determinations must consider both the direct effects of project-related activities as well as the "indirect (cumulative and secondary) effects which result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable." 15 C.F.R. § 930.11(g). As the CZMA regulations describe: "Indirect effects are effects resulting from the incremental impact of the federal action when added to other past, present, and reasonably foreseeable actions, regardless of what person(s) undertake(s) such actions." *Id*.

Here, potential effects of leasing and future lease development should be understood within the larger context, as some impacts that may not be particularly significant by themselves may be more significant when viewed as one of myriad impacts and stressors that are affecting the marine environment, the fishing industry, or other resources or communities. Given that the leasing of the Humboldt WEA is the first lease for offshore wind on the West Coast, it is also important to understand the lease in the context of larger efforts to ramp up the development of offshore wind on the U.S.

Pacific coast. The analysis of the effects of this proposed leasing activity, and any mitigation proposed to address its impacts, may have precedent-setting value in terms of how future wind leasing and development occur. Analysis of relevant cumulative impacts is addressed in the substantive sections of the Findings, below. This section provides the big-picture context for understanding the proposed lease and its potential cumulative effects.

### Humboldt Offshore Wind in Context

Federal waters offshore of the North Coast have experienced little development in the past. Existing activities offshore include the passage of vessels as part of the shipping industry and fishing activities. Other past offshore projects that land in Humboldt County include installation of fiber optic cables, up to four of which may land on the Samoa Peninsula (two were permitted on CDP 9-21-0165/CC-0004-21 in August 2021). Although cable installation for this project is still ongoing, the cable routes for this project include one that transects the southern portion of the Humboldt WEA. Further offshore are two cables running north and south, the Tata TGN cable (E-01-029/CC-111-01) and the Pacific Crossing-1 Cable (E-98-027/ CC-041-00).

As discussed in section A, both the federal and state governments have aggressive renewable energy targets, and the Humboldt WEA is one piece of BOEM's offshore wind development plans. BOEM is also engaging in an offshore wind planning process to identify wind energy areas in southern Oregon. A map of potential Oregon call areas[3] is available in **Exhibit 1-4**. In Oregon, the proposed Brookings call area stops at the California border. BOEM is also planning to lease the Morro Bay Wind Energy Area as part of the same lease sale as the Humboldt WEA. Other activities taking place on the outer continental shelf near Humboldt include naval training and testing activities, which create vessel traffic and underwater sound. Furthermore, the state of California, as directed by AB525, is embarking on a coast-wide planning effort to identify areas of sea space that could be appropriate for future offshore wind development. It is likely that if additional offshore wind areas are identified through this process, they could be considered by BOEM for future leasing.

### Cumulative Effects on Marine Resources

As offshore wind lease development occurs on the West Coast, migratory species will likely have to navigate multiple offshore wind developments and infrastructure as they go through their annual migrations, in which they typically move to the north in the summer and the south in the winter. Each offshore wind development project incrementally increases the risk of bird strikes, vessel strikes and entanglement, and increases the impacts of displacement. Whales and seabirds are of particular concern for these types of impacts. Individuals that are displaced from their normal migratory routes or foraging grounds must expend more energy to find food, leading to lower fitness and potentially impacting successful reproduction.

The impact of one offshore wind development may not create enough displacement or

[3] A call area is a precursor to designating a wind energy area; not all call areas become wind energy areas.

changes to show an effect, but effects may become evident as more offshore wind farms are developed. Each offshore wind development project would also incrementally increase the effects of artificial lighting on birds and would add to existing underwater sound from shipping and other sources. Although the operational sound of offshore wind development is expected to be low, with enough turbines over a large enough area, the underwater sound could lead to changes in marine wildlife behavior.

The effects of offshore wind in the Humboldt WEA will add to other stressors that marine life already has to manage on the West Coast. In its letter to BOEM on the draft EA, NOAA stated the following with respect to marine mammals:

> *As the National Academies of Sciences, Engineering, and Medicine described with regards to cumulative effects of stressors on marine mammals, marine mammals face a large array of anthropogenic and natural stressors, including, for example, noise pollution, loss of habitat, vessel traffic, fishing, competition for prey, and predators. Cumulatively, these stressors may compromise an individual's capacity to successfully thrive in the wild, affecting their physiological well-being or subtly altering their behavior. Multiple stressors may cumulatively affect marine mammal populations, particularly those with restricted ranges, narrow migratory routes, or low abundances. Recognizing the complexity of the interaction and cumulative effects of stressors on marine mammals and affected stocks is important in considering any activity(ies) associated with offshore wind energy within and adjacent to the Humboldt WEA.*

These comments aptly identify that marine species are already being impacted by ocean uses, and that offshore wind development will add to these impacts.

Additionally, more offshore wind development has the potential to create greater impacts on ocean processes, particularly upwelling. A modeling study by Integral Consulting showed that impacts to upwelling from the Humboldt WEA on its own were very small. However, the study modeled changes to ocean processes from a larger proposed set of wind energy call areas on the central coast and found that there were greater impacts due to the larger size of the areas being considered. As more WEAs are considered and eventually leased on the Oregon coast, it is important to continue tracking the impacts to upwelling on a regional scale.

Finally, installation of offshore wind turbines over multiple leases and wind energy areas has the potential to cumulatively impact benthic habitats and species. These changes may include the artificial reef effect, anchoring impacts to sensitive benthic habitats and associated species. The cumulative effects of offshore wind development on these habitats and species are not well understood at this time. Comprehensive baseline and post-project monitoring and implementation of an adaptive management framework will be critical in understanding cumulative effects and ensuring that effects are minimized.

### Cumulative Effects on Fishing

The fishing industry will also almost certainly experience cumulative effects from potential future offshore wind and other marine development in the region. The Humboldt WEA covers an area of approximately 206 square miles and the Morro Bay

area is approximately 375 square miles. Recently announced call areas off the coast of Oregon represent an additional approximately 1,800 square miles of potential leases. It is unknown to what level of development fishing and offshore wind can co-exist. Each development opportunity, while addressing critical climate goals and providing renewable power to the region, will come at a cost to the fishing industry and the provision of wild caught seafood products to the nation. The Coastal Commission evaluates whether proposed projects are consistent with the state's coastal management program, taking into account the projects' individual and cumulative effects on coastal uses and resources. Through its NEPA requirements, BOEM is also tasked with considering and disclosing the individual and cumulative impacts of its actions, and it is expected that these reviews will be provided during subsequent stages of development for future projects. Given the known range of fisheries coastwide, it can be anticipated that impacts to fisheries from the development of more than one lease area will occur in predominantly offshore fisheries such as the groundfish fishery, HMS fishery, and even the salmon or hagfish fishery. Proper siting of lease areas that avoid known fishing grounds with the best, most recent data[4] is a key factor in minimizing the overall impacts to the fishing industry. For more nearshore fisheries, such as Dungeness crab and halibut, shrimp or squid, cumulative impacts will be largely dependent on the location and siting of future infrastructure, such as cables and substations. Close coordination between BOEM, state and federal agencies, and lessees with potentially impacted fisheries coastwide will ensure that the totality of impacts to the industry is minimized while still maximizing the region's renewable energy goals.

## D. Coordination with other Agencies, Consultations with Tribes and Fishing Communities

### Coordination with State and Federal Agencies

In 2016, BOEM established an intergovernmental Renewable Energy Task Force (Task Force) with California to facilitate coordination among federal agencies and affected state, local, and tribal governments throughout the offshore wind leasing process. Following the first Task Force meeting and through the leadership of the California Energy Commission, BOEM and the state engaged in a collaborative, data-based offshore wind energy planning process to foster coordinated and informed decisions about California's ocean resources. To support the planning process, BOEM, the California Public Utilities Commission, and the California Energy Commission funded the California Offshore Wind Energy Gateway. The Gateway assembles geospatial information on ocean wind resources, ecological and natural resources, ocean commercial and recreational uses, and community values. The information in the gateway has since been used to develop models in the Environmental Evaluation Modeling System (EEMS) to provide a transparent and data-driven means for assessing

[4] The OSW Energy Gateway and Environmental Evaluation Modeling System (EEMS) modelling tool contain regionwide fisheries and environmental data. The OSW Energy Gateway is hosted on Data Basin, a science-based mapping and analysis platform and available for data exploration here: https://caoffshorewind.databasin.org/[5] This data comes from AIS which is only required on vessels longer than 65 feet.

a range of considerations at a given location, such as existing energy potential, ocean uses, fisheries, and marine life occurrence. Commission staff have participated in the Task Force since its development and have used the tools and data provided through the Offshore Wind Energy Gateway and EEMS model throughout this report. Additionally, data and information gathered through the task force have informed BOEM and the state of conflicts with existing ocean uses, viewshed, fishing, and wildlife. BOEM has used the information gathered to inform its wind energy area identification process.

In addition to the Task Force, Commission staff also participate in a state interagency working group to coordinate the state's regulatory, research, and planning work on offshore wind. California State Agencies participating in the working group include the:

- California Energy Commission
- Ocean Protection Council
- Department of Fish & Wildlife
- Public Utilities Commission
- State Lands Commission
- Governor's Office of Planning and Research
- Department of Parks & Recreation

The state interagency working group has worked together to provide state comments to BOEM on the Humboldt lease sale Environmental Assessment Scoping and on the Draft Environmental Assessment. As discussed further below, the working group has also coordinated on outreach to Tribes, in addition to the tribal consultation done by Commission staff and has coordinated on outreach to fishing communities.

In its consistency determination and communications with Commission staff, BOEM indicates that it may engage in the following legal or agency consultations as part of its federal environmental review process for offshore renewable energy projects:

- National Marine Fisheries Service (NMFS): Essential Fish Habitat Consultations
- NMFS: Endangered Species Act Consultations
- U.S. Fish and Wildlife Service: Endangered Species Act Consultations
- National Historic Preservation Act Consultations (Section 106)
- Clean Water Act Consultations
- Clean Air Act Consultations
- Migratory Bird Treaty Act Consultations
- Tribal Consultations

At this time, there are no other formal approvals from state agencies, with the exception of this consistency determination, needed for the proposed lease sale to move forward. During lease exploration activities, any geophysical survey activities that occur within state waters would need to be authorized by the California State Lands Commission. Later, when lessees submit their COPs and begin seeking approval for development of their leases, other state and local agencies, such as the State Lands Commission and possibly local governments and the Humboldt Harbor District, will have permitting or leasing authority over development in state waters and on shore. This may include approval authority for infrastructure required to bring the electricity to shore and connect

it to the grid, and Humboldt Harbor District-related development to support construction and operation of future projects.

### Early Engagement with Tribes

State and federal agencies have conducted numerous efforts to engage Tribes and provide information on potential offshore wind development. In 2016, BOEM sent formal letters to all federally recognized and non-federally recognized Tribes with known or potential interest in California's offshore environment, inviting them to join the BOEM California Intergovernmental Renewable Energy Task Force. The first task force meeting in October 2016 included representatives from six Tribes: Bear River Band of the Rohnerville Rancheria, Blue Lake Rancheria, Cher-Ae Heights Indian Community of the Trinidad Rancheria, Coyote Valley Band of Pomo Indians, Santa Ynez Band of Chumash Indians, and Tolowa Dee-ni' Nation.

In 2017, the Governor's Tribal Advisor and the CEC formed a State Tribal Offshore Renewable Energy Working Group (Tribal Working Group) to gain input from federally recognized and non-federally recognized Tribes, inform the California offshore renewable energy planning efforts, and simplify the exchange of information between the State and Tribes (BOEM, 2018). This Tribal Working Group provided input on the planning and siting process for offshore wind, the need to consider and avoid impacts to tribal cultural resources, the need to avoid environmental impacts, and the potential construction, operation, and decommissioning impacts surrounding these projects. Additional description of BOEM's and the state's early outreach to Tribes may be found in Appendix 4 of BOEM's Outreach Summary Report dated September 2018, and an Addendum discussing outreach activities through 2021 (BOEM, 2021).

Finally, additional in-person outreach meetings were conducted in August 2021 between state agencies, including the Coastal Commission, and some North Coast Tribes, including the Yurok Tribe, Cher-Ae Heights Indian Community of the Trinidad Rancheria, the Blue Lake Tribe, the Wiyot Tribe and the Bear River Tribe of the Rohnerville Rancheria.

### Consultations with Tribes

During the review of this project, and subsequent to the early outreach described above, in August 2021, Commission staff reached out to representatives of Native American Tribes with formal tribal consultation invitations and presented at the Northern California Tribal Chairmen's Association Meeting in October 2021. Through outreach and invitations, Commission staff contacted the following Native American Tribes with connections to the Humboldt area:

- Bear River Band of Rohnerville Rancheria
- Big Lagoon Rancheria
- Blue Lake Rancheria
- Cahto Tribe
- Cher-Ae Heights Indian Community of the Trinidad Rancheria
- Coast Indian Community of the Resighini Rancheria
- Coyote Valley Band of Pomo Indians

- Elk Valley Rancheria
- Guidiville Indian Rancheria
- Hoopa Valley Tribe
- Hopland Band of Pomo Indians
- Karuk Tribe
- Kashia Band of Pomo Indians
- Manchester Band of Pomo Indians
- Melochundum Band of Tolowa Indians
- Noyo River Indian Community
- Pinoleville Pomo Nation
- Potter Valley Tribe
- Redwood Valley or Little River Band of Pomo Indians
- Round Valley Reservation/Covelo Indian Community
- Sherwood Valley Band of Pomo Indians
- Tolowa Dee-ni' Nation
- Wiyot Tribe
- Yokayo Tribe
- Yurok Tribe

Contact information for these Tribes was provided by the Native American Heritage Commission.

Commission staff received five responses requesting tribal consultation from the Bear River Band of the Rohnerville Rancheria, Blue Lake Rancheria, Elk Valley Rancheria, the Wiyot Tribe, and the Yurok Tribe. Commission staff set up zoom consultation meetings in early- to mid-November 2021, attended by the Blue Lake Rancheria, the Wiyot Tribe, and the Yurok Tribe, and held follow up consultation meetings, via zoom in March 2022. Additional discussion about the content of these consultations can be found in section K, Tribal and Cultural Resources.

**Outreach to Fishing Communities**

As part of the process of developing its Environmental Assessment for the lease sale, BOEM has held virtual scoping meetings with members of the public, including the fishing community. Coastal Commission staff, the Department of Fish and Wildlife, State Lands Commission, and Energy Commission held a series of meetings with the fishing community on the north and central coast in the Fall of 2021, which BOEM also attended. The aforementioned agencies returned to the North Coast fishing communities on March16-17, 2022 to discuss their findings, information gaps (and future studies) and to ground truth fisheries information as well as to discuss statewide spatial planning efforts. These meetings were facilitated with the intent of gaining an understanding of the potential impacts of offshore wind development on fisheries and to begin developing a mitigation framework that would ensure fisheries impacts were addressed through continued engagement between fishing communities, state agencies, and developers. Key contributors in this outreach were leaders of the fishing community from the Humboldt Bay Fishermen's Marketing Association, Crescent City Fishermen's Marking Association, Salmon Troller's Marketing Association, Morro Bay

Commercial Fishermen's Association, and Commercial Fishermen of Santa Barbara. Meeting notes for outreach activities are available on the Coastal Commission's website.

## E. Marine Resources and Water Quality

Section 30230 of the Coastal Act states:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231 of the Coastal Act states:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

### Humboldt Wind Energy Area

The Humboldt WEA is in the California current ecosystem, which flows south from British Columbia, Canada to Baja California, Mexico. The WEA is located on the continental slope; ecologically, this area is a transition zone between coastal species that are found in greater abundance closer to shore, and species that are more common beyond the continental shelf in the open ocean. Lease exploration and eventual lease development of the Humboldt WEA may affect marine resources in several ways. Lease exploration has the potential to negatively affect marine resources through seafloor disturbance and increased turbidity, elevated levels of underwater sound, and increased entanglement and ship strike risk. Lease development has the potential to adversely affect marine resources through habitat disturbance, turbine strikes, increased entanglement risk, marine species displacement, avoidance, and attraction, ship strike risk, elevated levels of underwater sound, fish aggregation and artificial reef effect, invasive species weakened upwelling, and electromagnetic fields. Both lease exploration and lease development have the potential to increase the probability of oil spills, which would adversely affect water quality. The Coastal Act has specific provisions relating to oil spills, and therefore the oil spill analysis and findings are discussed in section G of these findings.

### Lease Exploration Impacts

Lease exploration activities may include installing and anchoring meteorological buoys in the lease area, using sound to conduct geophysical surveys, and using research vessels to conduct biological, archaeological and geotechnical studies in the WEA. Up to three buoys are expected to be installed and remain in the WEA for 5 years, and BOEM anticipates a total of 21-30 vessel trips for buoy installation, maintenance and removal. BOEM anticipates significantly higher vessel trips for geophysical surveys (64-153 trips), geotechnical sampling (18-247 trips), avian surveys (24-48 trips), and marine mammal and sea turtle surveys (24-48 trips). Fish surveys are expected to happen once per day for the duration of a lessee's survey plan or SAP.

Seafloor Disturbance and Water Quality

According to BOEM's EA, generally, the seafloor within the Humboldt WEA consists of soft sediment, with rock outcrops forming the minority of substrates. The BOEM EA and the offshore wind energy gateway show that the Humboldt WEA has scattered areas of rocky outcroppings and hard substrate habitat running diagonally from the northwest to the southeast portion of the area. The rocky reef areas correspond to NOAA-designated Habitats of Particular Concern (HAPC). The Humboldt WEA and surrounding areas of the seafloor also include deep-sea corals and sponges. These species are slow-growing, long-lived and provide important habitat for rockfish, flatfish, anemones, and other invertebrates. See **Exhibit 2-1** for a map of seafloor features in the Humboldt WEA and surrounding areas and **Exhibit 2-2** for a map of seafloor bathymetry in the Humboldt WEA.

Anchoring and collection of sediment samples associated with lease exploration has the potential to cause localized seafloor disturbance and water quality effects by temporarily decreasing water clarity and increasing turbidity. Indirect impacts of decreased water clarity and increased turbidity include clogging filtration systems for filtering animals, decreasing sight range for visual predators and prey, and smothering benthic organisms (Maxwell et al., 2022). Anchoring and sediment sampling may also directly or indirectly impact sensitive benthic species inhabiting areas of hard substrate habitat or rock outcroppings. BOEM expects collection of sediment samples to impact up to 108 square feet of seafloor per sample and anchoring to create a larger area of seafloor disturbance. Anchors for boat and discus shaped buoys are expected to have a footprint of 6 square feet with an anchor sweep impact area of approximately 8.5 acres per buoy anchoring.

In its consistency determination, BOEM states:

> *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.*

The mud and sand seafloor in the Humboldt WEA is expected to recover quickly from disturbance related to sample collection and temporary anchor placement. A study on anchoring impacts by the Oregon Wave Energy Trust found that gravel and broken shells were more common around anchoring sites, but this did not significantly affect median sediment grain size or the benthic macrofauna community on soft-bottom habitat (Henkel et al., 2016).

However, the Humboldt WEA contains areas of hard substrate habitat, seamounts, and deep-sea corals and sponges. These habitats are rare, provide important nursery grounds, food sources and shelter for sensitive species and are slow to recover from damage and should be protected from anchoring impacts, including indirect impacts relating to increased turbidity. To ensure that the biological productivity of these important habitat areas is sustained, **Condition 2** requires BOEM to ensure that lessees avoid intentional contact with hard substrate, rock outcroppings, seamounts, or deep-sea coral and sponge habitat during all lease exploration activities and requires a buffer that fully protects these habitats. In addition, **Condition 1(f)(iv)** requires that BOEM require lessees to submit an Anchoring Plan for any survey plan that requires vessel anchoring and **Condition 1(b)** provides for Commission staff review of all survey plans. With these protections in place, impacts to hard substrate habitat areas will be minimized or avoided.

Elevated Levels of Underwater Sound

Lease exploration activities may result in habitat exclusion or avoidance by marine species due to the use of sound in geophysical surveys. Geophysical surveys can be conducted using high or low energy equipment. In previous actions, the Commission has denied or objected to projects proposing use of high energy geophysical surveys because of the significant adverse impacts to marine species including marine mammals, sea turtles, fish and invertebrates. For offshore wind lease exploration, BOEM indicates in its CD and EA that only low-energy surveys will be authorized under the proposed leases. Low-energy surveys, while significantly less problematic than high-energy surveys, do still have the potential to result in impacts to marine mammals and sea turtles. Fish and invertebrates are not expected to be affected by these types of surveys.

According to BOEM's EA, six species of baleen whales and twelve species of toothed whales are expected to occur in the Humboldt WEA. Additionally, five species of seals and sea lions are known to be present in the area, as well as one species of sea turtle. Table 2-1 below, from BOEM's EA, lists the marine mammals present in the area, and provides their federal protected status. The Northern elephant seal, Guadalupe fur seal, and Pacific right whale is also protected under the California Endangered Species Act and are listed as fully protected.

**Table 2-1: Protected Marine Mammal and Sea Turtle Species Expected to Occur in the Project Area** (DPS refers to Distinct Population Segment as defined under the ESA)

| Common name | Scientific Name | Stock | ESA/MMPA Status | Occurrence |
|---|---|---|---|---|
| **Baleen Whales** | | | | |
| Blue whale[1] | *Balaenoptera musculus* | Eastern North Pacific | Endangered/Depleted | Late summer and fall |
| Fin whale[1] | *Balaenoptera physalus* | California, Oregon, and Washington | Endangered/Depleted | Year round |
| Sei whale[1] | *Balaenoptera borealis* | Eastern North Pacific | Endangered/Depleted | Uncommon |
| Minke whale[1] | *Balaenoptera acutorostrata* | California, Oregon, and Washington | - | Occasional |
| Humpback whale[1] | *Megaptera novaeangliae* | California, Oregon, and Washington (Central American DPS and Mexico DPS) | Endangered/Threatened | Spring to fall |
| North Pacific Gray Whale[1] | *Eschrichtius robustus* | Eastern North Pacific | - | Oct-Jan and March-May |
| **Toothed and Beaked Whales** | | | | |
| Sperm whale[1] | *Physeter macrocephalus* | California, Oregon, and Washington | Endangered/Depleted | Year round |
| Killer whale | *Orcinus orca* | Eastern North Pacific Transient/ West Coast Transient[2] | - | Sporadic |
| Killer whale – southern resident | *Orcinus orca* | Southern 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[3] | - | |
| Northern right whale dolphin | *Lissodelphis borealis* | California, Oregon, and Washington | - | Year round |
| Pacific white-sided dolphin | *Lagenorhynchus obliquidens* | California, Oregon, and | - | Year round |

| | | | | |
|---|---|---|---|---|
| | | Washington | | |
| 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** | | | | |
| 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[1] | *Arctocephalus townsendi* | Throughout its range | Threatened | Spring/Summer, seasonal low numbers |
| **Sea Turtles** | | | | |
| Leatherback sea turtle | *Dermochelys coriacea* | Throughout range | Endangered | Uncommon |

Notes:

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

2 This stock is mentioned briefly in the Pacific Stock Assessment Report (Carretta et al., 2018; Carretta et al., 2016) 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).

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

ESA = Endangered Species Act MMPA = Marine Mammal Protection Act

The use of sound in geophysical surveys may affect the behavior of marine mammals due to masking their ability to hear important environmental sounds and requiring more intense vocalizations; intense sounds may damage their ability to hear. BOEM's EA finds that underwater sound may change a number of important biological behaviors including migration, feeding, resting, communication, and breeding. The type and severity of a potential effect is, in part, due to the hearing thresholds exhibited by different types of marine mammals. Specifically, baleen whales hear lower frequencies. Sperm whales, beaked whales, and dolphins hear mid-frequencies, and porpoises hear high frequencies. Seals, sea lions and sea turtles also hear low frequencies. Table 2-2 below outlines the general hearing range and impulsive acoustic thresholds for marine mammals and sea turtle species.

**Table 2-2: Impulsive Acoustic Thresholds Identifying the Onset of PTS and TTS for Marine Mammals[1] and Sea Turtle[2] 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 | 213 dB Peak |
| | | 183 dB cSEL | 179 cSEL |
| Mid-frequency (e.g., Dolphins and Sperm Whales) | 150 Hz to 160 kHz | 230 dB Peak | 224 dB Peak |
| | | 185 dB cSEL | 178 dB cSEL |
| High frequency (e.g., porpoise) | 275 Hz to 160 kHz | 202 dB Peak | 148 dB Peak |
| | | 155 dB cSEL | 153 dB cSEL |
| Phocid pinnipeds (true seals) (underwater) | 50 Hz to 86 kHz | 218 dB Peak | 212 dB Peak |
| | | 185 dB cSEL | 181 dB cSEL |
| Otariid pinnipeds (sea lions and fur seals) (underwater) | 60 Hz to 39 kHz | 232 dB Peak | 226 dB Peak |
| | | 203 dB cSEL | 199 dB cSEL |
| Sea Turtles | 30 Hz to 2 kHz | 230 dB Peak | 226 dB Peak |
| | | 204 dB cSEL | 189 dB cSEL |

Notes:
1 (Nmfs, 2018).
2 (Navy, 2017).
cSEL = cumulative sound exposure level dB = decibels Hz = hertz kHz = kilohertz

BOEM's impact analysis uses the highest power levels of survey equipment and the most sensitive frequency setting for marine life hearing group to determine impacts. The analysis does not consider the directionality or tow depth of sound sources, and therefore likely overestimates the impacts of the surveys on marine life. Section 3.5.2 of BOEM's EA includes additional details on how the analysis to assess the impacts of geophysical surveys was conducted.

According to BOEM's analysis in its EA, for many marine mammal species, the distance from the survey equipment that results in a potential for injury is generally small, ranging from 0-154 feet. The largest possible distance that could result in injury is 825 feet for porpoise species, when a 100 kHz multi-beam echosounder is used. Injury thresholds for sea turtles are higher than those for marine mammals, and based on BOEM's EA analysis, geophysical survey activities would not result in injury to sea turtles from sound. Table 2-3 below provides a summary of the distance, in meters, for potential injury of marine mammals and sea turtles from proposed geophysical survey equipment.

**Table 2-3: Summary of PTS Exposure Distances for Protected Marine Mammal Species from Mobile HRG Sources Towed at a Speed of 4.5 knots**

| 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 |
| **Mobile, Impulsive, Intermittent Sources** | | | | | | | |
| Boomers, Bubble Guns (4.3 kHz) | 176 dB SEL<br>207 dB RMS<br>216 peak | 0.3 | 0 | 5.0 | 0.2 | 0 | 0 |
| Sparkers (2.7 kHz) | 188 dB SEL<br>214 dB RMS<br>225 peak | 12.7 | 0.2 | 47.3 | 6.4 | 0.1 | 0 |
| Chirp Sub-Bottom Profilers (5.7 kHz) | 193 dB SEL<br>209 dB RMS<br>214 peak | 1.2 | 0.3 | 35.2 | 0.9 | 0 | NA |
| **Mobile, Non-Impulsive, Intermittent Sources** | | | | | | | |
| Multi-beam echosounder (100 kHz) | 185 dB SEL<br>224 dB RMS<br>228 peak | 0 | 0.5 | 251.4* | 0 | 0 | NA |
| Multi-beam echosounder (>200 kHz) | 182 dB SEL<br>218 dB RMS<br>223 peak | NA | NA | NA | NA | NA | NA |
| Side-scan sonar (>200 kHz) | 184 dB SEL<br>220 dB RMS<br>226 peak | NA | NA | NA | NA | NA | NA |

Notes:

1 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

BOEM repeated their analysis for disturbance (as opposed to injury) distances from the geophysical survey equipment. Table 2-4 below provides a summary of the maximum disturbance distances, in meters, for marine mammals and sea turtles.

**Table 2-4: Summary of Maximum Disturbance Distances for Protected Marine Mammal Species from Mobile HRG Sources Towed at a Speed of 4.5 knots**

| 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 |
| **Mobile, Impulsive, Intermittent Sources** | | | | | | |
| 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** | | | | | | |
| Multi-beam Echosounder (100 kHz) | NA | 370 | 370 | NA | NA | NA |
| Multi-beam Echosounder (>200 kHz) | NA | NA | NA | NA | NA | NA |
| Side-scan Sonar (>200 kHz) | NA | NA | NA | NA | NA | NA |

Notes:

1 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, 2016) (Crocker and Fratantonio (2016).

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

The range of disturbance distances for all protected species is 131-1,647 feet, with sparkers, a seismic survey method that uses an electric spark in a sonde to generate high-frequency sound waves, causing the greatest area of disturbance across marine mammal species, according to BOEM's EA (Selley and Sonnenberg, 2015).

To reduce the potential for injury to marine mammals and sea turtles, and minimize any possible disturbance, BOEM requires its lessees to incorporate a set of mitigation measures into any lease exploration work, as described in **Appendix D** to BOEMs EA. Selected measures include:

- Requiring that the vessel captain and crew maintain a vigilant watch for all protected marine mammals
- Independent Protected Species Observers (PSOs) or trained crew must monitor a vessel strike avoidance zone of 500 meters (1,640 feet) or greater from any whales or unidentified large marine mammal and 50 meters (164 feet) or greater

from any other marine mammal species visible at the surface.

  - Autonomous vessels must be equipped with a thermal and HD cameras facing forward and at an angle to provide a field of view ahead of the vessel. A dedicated operator must be able to monitor the real-time output of the camera.
  - Survey plans must identify vessel strike avoidance measures.
  - All vessel crew members must be briefed in the identification of protected marine mammal species and best practices for avoiding collisions.
  - A minimum separation distance of 500 meters (1,640 feet) from all whales must be maintained around the surface of the vessel at all times.
  - If a large whale is sighted within 200 meters (656 feet) of the forward path of a vessel, the vessel operator must reduce speed and shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 500 meters (1,640 feet). If stationary, the vessel must not engage engines until the large whale has moved beyond 500 meters.

- If an ESA-listed species of whale is detected within or entering the exclusion zone, any noise-producing equipment operating below 180 kHz must be immediately shut off until the minimum separation distance of 500 meters (1,640 feet) is re-established.
- If the exclusion zone cannot be adequately monitored for whale presence (e.g., at night or during low visibility conditions), the survey must be stopped until such time that the exclusion zone can be reliably monitored.
- At the start of a survey, or after a shutdown, lessees must ensure that a "ramp up" of the electromechanical survey equipment occurs whenever technically feasible.
- If the trained lookout is a vessel crew member and not a PSO, this must be their designated role and primary responsibility while the vessel is underway.
- Vessels underway must not divert their course to approach any listed species
- The lessee must ensure all vessel operators check for daily information regarding protected species sighting locations. These media may include, but are not limited to: Channel 16 broadcasts, and the Whale/Ocean Alert app.

With these protective measures, BOEM believes that any risk of injury to marine mammals is fully prevented and that impacts associated with disturbance will be reduced and prevented. However, it is worth noting that NMFS may require an incidental harassment authorization for these surveys if NMFS believes surveys will result in harassment marine mammals. If one of BOEM's lessees requires an incidental harassment authorization, that authorization would be subject to federal consistency review and would likely come before the Commission as a consistency certification.

The Commission agrees that the measures above will appropriately minimize risks to marine life. However, the measures do not fully maintain marine resources and protect species from impacts related to noise from geophysical surveys. To further minimize the impacts of geophysical surveys, and to ensure consistency with state requirements for surveys in state waters, under **Condition 1(e)** BOEM will require its lessees to use low-energy equipment (i.e., subbottom profilers, echosounders, and side-scan sonars) to conduct geophysical surveys and will encourage its lessees to use operators that conduct their surveys consistent with the provisions of the California State Lands Commission's low-energy geophysical survey program. This program has many similarities to BOEM's requirements as outlined in **Appendix D** of the draft EA but requires a minimum of two PSOs on survey vessels operating geophysical equipment at frequencies less than 200 kHz. The program also provides transit requirements and expedited survey requirements to minimize impacts to pinniped haul out sites. Finally, this program includes reporting requirements to ensure that information about the surveys, marine mammals sighted during survey operations, and other relevant information is disclosed to the public in a timely fashion.

Additionally, to minimize the risk of cumulative impacts on sensitive species from multiple surveys being conducted at the same time, **Condition 1(a-d)** will require BOEM to encourage coordination and collaboration between lessees on their geophysical survey plans to increase efficiency and minimize impacts to coastal resources. This condition also requires BOEM to ensure that documents and data coming out of the research conducted are publicly available to the maximum extent feasible.

Ship Strike Risk

Collisions with large vessels ("ship strikes") is recognized as the leading cause of death for blue and fin whales, and the second highest source of mortality for humpback whales offshore the U.S. West Coast (Carretta et al., 2021; Rockwood et al., 2017). All of these species occur in the vicinity of the Humboldt WEA, and thus, have the potential to be injured or killed in a collision with a vessel conducting lease exploration activities. Please see **Exhibit 2-3** for selected whale density maps.

Additionally, leatherback sea turtles may occur in the Humboldt WEA. Sea turtles are required to surface to breathe air, putting them at risk for ship strikes. However, the Humboldt WEA is far from both leatherback sea turtle critical habitat and is not frequented by leatherback sea turtles. Leatherback sea turtles are more abundant off San Francisco Bay and farther south. **Exhibit 2-4** shows leatherback geolocation tracks off the West Coast in relation to the Humboldt WEA.

BOEM anticipates that vessel traffic over a 3-year period will range from 130-178 vessel trips for 24-hour operations, or 448-496 vessel trips for 10-hour daily operations. An additional 21–30 round trips are expected over a 5-year period for the deployment, maintenance, and decommissioning of 3 metocean buoys. The vessel traffic anticipated for lease exploration represents a significant increase over general vessel traffic in the Humboldt WEA. In 2017, a total of 55 vessel trips,[5] excluding fishing trips, were recorded within the Humboldt WEA. If the highest number of vessel trips for site characterization activities were divided evenly over 3 years, the number of vessel trips

[5] This data comes from AIS which is only required on vessels longer than 65 feet.

in the Humboldt WEA due to these activities would be approximately 165, which triple the current level of vessel traffic. It is unlikely that the site characterization vessel trips will be spread evenly over the 3-year period, but it is illustrative of the increase in vessel traffic that these activities will create.

BOEM is requiring vessel speeds during site characterization activities to be no more than 5 knots (2.57 m/s), but transit speeds will vary. As discussed above, BOEM is requiring several measures, including PSOs and a vessel strike avoidance zone of 500 meters (1,640 feet) to prevent vessel strikes. The full set of measures are described in **Appendix D** to BOEMs Draft EA.

These measures rely heavily on PSOs to fully minimize the risk of ship strikes to protected marine species. The measures described above are very similar to requirements the Commission has included in previous actions on similar projects, although there are two principal differences: 1) the Commission has only authorized the use of trained crew members as marine mammal observers in very limited situations where adding additional people to the boat was not feasible due to the size of the boat, and 2) the Commission has generally required daily sighting reports and/or a final report summarizing marine wildlife sightings, behavioral changes and any actions taken to avoid marine wildlife. BOEM's requirements, as outlined in **Appendix D** to its EA has similar reporting requirements, but the timing of reporting is on the 15th of each month for the previous calendar month of surveys. The Commission's requirement for trained and experienced PSOs rather than crew members is due to the significantly increased efficacy of sightings by dedicated PSOs in comparison to trained crew members. Prior research on the effectiveness of PSOs in comparison to trained Navy lookouts have shown that the vast majority of marine mammal observations made by PSOs are missed by Navy lookouts.[6] Additionally, it is critical that PSOs are focused on their observation tasks, rather than including monitoring the vessel strike avoidance zone in addition to several other duties while on board the vessel, which would be the case if a crew member was also acting as a PSO.

To bring the proposed measures into consistency with the Coastal Act's requirement to maintain healthy populations of marine species, under **Condition 1(f)(i)**, BOEM will require lessees to include Marine Wildlife Protection and Monitoring Measures in their survey plans and SAPs. These measures include training all project personnel, including a minimum of one qualified marine mammal observer on the vessel to conduct observations, providing a sufficient number of protected species observers to ensure complete coverage of the surrounding marine environments, providing appropriate safety and monitoring equipment, including night-vision equipment if needed, ensuring observers have the authority to stop activities that could harm a marine mammal or sea turtle, immediate reporting of any entanglement immediately to NMFS, and submittal of

[6] The Commission's adopted findings in support of its decision on the Navy's consistency determination for its training and testing program for the SOCAL Range Complex (CD-0001-18) discuss these past results in additional detail – available here: https://documents.coastal.ca.gov/assets/marine-acoustics/1%20CD-0001-18%20CD%20Navy%20HSTT%20Adopted%20Findings.pdf

a final report.

In addition, recent studies have shown that reducing vessel speeds is a critical action to lower the risk of collisions between marine mammals and vessels. Most cases where whales were known to be severely injured or killed occurred at vessel speeds of 14 knots or more (Laist et al. 2006). Reducing vessel speeds to 10 knots has been found to reduce the risk to endangered baleen whales, of both ship collision and mortality, if a collision occurs (Vanderlaan and Taggart, 2007). Due to the risk of vessel strikes, NMFS has imposed mandatory speed reductions on commercial ships on the east coast, to protect the North Atlantic right whale. 73 Fed. Reg. 60173 (Oct. 10, 2008). On the West Coast, endangered blue whales and other species have been struck and killed by vessels in the Santa Barbara Channel, Southern California Bight, and off San Francisco leading NMFS to establish a voluntary speed restriction for mariners. Speed reductions are also taking place in Southern California to reduce air emissions. To bring the proposed measures into consistency with the Coastal Act's requirement to maintain healthy populations of marine species and minimize the risk of injury or death to marine mammals and sea turtles, **Condition 3** requires BOEM to limit vessel speeds, including during transit, to no more than 10 knots.

Increased Entanglement Risk

BOEM's lease sale would authorize the placement of up to three buoys and the use and anchoring of vessels in the Humboldt WEA. Both these activities would incrementally increase the risk of entanglement to marine mammals. However, derelict fishing gear can get caught on mooring lines creating a greater risk of entanglement to marine mammals than mooring lines themselves (Benjamin et al., 2014). In 2020, NOAA confirmed 17 entangled whales off the West Coast or in other countries that were entangled in U.S. commercial fishing gear (National Marine Fisheries Service, 2021). Entanglement can result in asphyxiation, tissue damage, reduced foraging ability, limited mobility, and impacts on breeding and population (Maxwell, et al., 2022). To address this concern, **Condition 7** requires BOEM to require lessees to have an independent fishing liaison responsible for regular communication and coordination with fishermen. The liaison will work with the fishing to coordinate survey work and to develop a process for managing and reporting any conflicts, including installation of any equipment that could become a secondary entanglement hazard. Frequent communication between the fisheries liaison and fishing industry will help ensure that any conflicts with gear or timing are resolved and will help mitigate potential entanglement impacts throughout the course of lease exploration activities.

BOEM plans for lessees to perform maintenance and travel to their metocean buoys once annually. The low number of moorings expected to be added to the Humboldt WEA during the lease exploration phase is expected to result in a minimal increase to entanglement risk.

Conclusion

Lease exploration activities have the potential to degrade water quality, disturb seafloor habitats, increase underwater sound and thus impact marine mammals and sea turtles, increase the risk of ship strikes during transit to and from the WEA for surveys and incrementally increase the risk of entanglement. Due to the fact that marine mammals,

turtles, and other marine life moves between the coastal zone and federal waters, impacts within the WEA will have spillover effects on marine life in the coastal zone. Almost all of these effects are much smaller in scale and intensity than the effects of lease development, described below. The measures that BOEM has developed and **Conditions 1, 2, 3, and 7** will reduce the likelihood and magnitude of these impacts as described in detail above. Therefore, with these conditions included, BOEM's allowable lease exploration activities are consistent with sections 30230 and 30231 of the Coastal Act.

**Future Lease Development Impacts**

As described in section B of these findings, BOEM's CD covers lease exploration (e.g., site characterization activities and surveys during leasing), however the Commission's analysis also covers reasonably foreseeable activities associated with developing a lease. This section describes potential siting-level effects associated with future offshore wind development within the WEA. This section considers general features of an offshore wind development projects, such as anchors, mooring lines, inter-array cables, and moving turbine blades, and how those features are expected to interact with the environment. These potential adverse effects include habitat disturbance, turbine strikes, increased entanglement risk, marine species displacement, avoidance, and attraction, ship strike risk, elevated levels of underwater sound, fish aggregation and artificial reef effect, invasive species weakened upwelling, and electromagnetic fields.

Seafloor Disturbance

As discussed under the lease exploration section above, the Humboldt WEA primarily consists of soft-bottom habitat, with sections of rock outcroppings and a seamount or ridge in the eastern portion of the area. See **Exhibit 2-1** for a map of seafloor habitat within the WEA, and **Exhibit 2-2** for a map of seafloor bathymetry within the WEA. Lease development will require far more extensive use of anchors to secure floating turbines and transmission infrastructure than the lease exploration phase. Floating turbines are expected to require a minimum of three anchors per turbine. As mentioned above in section B, the four primary anchor types are drag-embedment, suction caissons, gravity anchor, and anchor piles. Suction caisson and gravity anchors are typically less impactful to benthic ecosystems as they do not drag as much on the seabed. However substantial innovation is ongoing in developing anchors for the offshore wind industry and the anchor types proposed in future consistency certifications may be hybrids of the anchor types discussed here. The specific type of floating platform proposed will also influence the proposed moorings, which may include taut, semi-taut and catenary moorings. If the proposed wind projects use catenary moorings, additional impacts to the seafloor are expected due to dragging and movement of the anchor chains and lower portions of mooring lines on the seafloor. Because the details of future wind development are currently unknown, identifying the impact areas of specific anchor types is not feasible at this time. As described in the previous section, **Condition 2** requires BOEM to create a lease condition that ensures lessees avoid intentional bottom contact within hard substrate, rock outcroppings, seamounts, or deep-sea coral and sponge habitat and include a buffer that fully protects these habitats from bottom contact. The Commission expects that a similar condition

will apply to lease development.

Installation of electrical export cables to bring power from the Humboldt WEA to shore is also expected to result in disturbance to the seafloor. Potential future Humboldt Harbor District development also has the potential to result in disturbance to seafloor habitat within Humboldt Bay. Historically, the Commission has required a number of measures to minimize impacts associated with offshore cables that would likely be applicable to the offshore wind industry. For example, the Commission has required that offshore cables be sited to avoid hard substrate, other important marine habitat and hazardous areas and to be buried where possible to minimize entanglement of marine species or snags from other ocean use. Where cables are unable to avoid hard substrate habitat, the Commission has required mitigation in the form of a mitigation fee used to remove derelict fishing gear and other marine debris to restore ocean habitat.

In the Humboldt area specifically, future cables will need to be sited to avoid existing hazards and to protect nearshore habitats and marine resources. For example, the United States Environmental Protection Agency has a designated dredge sediment disposal site off Humboldt Bay (the HOODs site). This site is just beyond the three nautical mile state waters boundary, and almost directly offshore of the mouth of Humboldt Bay. Cables will need to be sited to avoid this disposal site and any other identified hazards or conflicts within or offshore of Humboldt Bay. Humboldt Bay also hosts a variety of important habitats and species including extensive areas of eelgrass habitat. Future development, including cables and Humboldt Harbor District development, will need to be sited, constructed and operated to ensure that these habitats are maintained, enhanced and where feasible, restored. Because of the biological significance of eelgrass and other nearshore and coastal habitats, these areas are afforded special protection under the Coastal Act.

Turbine Strikes

Turbine strikes have the potential to be a major environmental impact from wind energy, whether offshore or onshore. Major factors influencing the likelihood of turbine strikes include bird or bat abundance in the area, flight heights, turbine rotation speeds and wind farm or turbine avoidance or attraction, as discussed above. For birds that are attracted to offshore wind farms, there is a greater risk of turbine strikes and mortality.

At least 80 species of seabirds occur along the California coast, of which five species (the sooty shearwater, western gull, common murre, California gull, and Cassin's auklet) comprise 70% of all individuals observed during surveys (Dick, 2016). Of the 80 species found off California, 28 breed locally and 52 are migratory. However, the majority of seabirds occur closer to shore. Table 2-5 below provides a list of select seabird species in and near the Humboldt WEA. Of the species represented in this table, loons, grebes, sea ducks, and alcids (including murres, puffins and auks), have high displacement vulnerability from the area, and gulls and cormorants have attraction vulnerability. Around half of the species listed in Table 2-5 may experience displacement or attraction to eventual wind farm development. More information on attraction and displacement is included in the attraction and displacement section below.

### Table 2-5. Selected Seabird Species in and near the Humboldt WEA

*Local residency status (Dick, 2016) for select seabird species in and near the Humboldt WEA*

| Species | Local Residency Status |
|---|---|
| Laysan albatross | migrant |
| Black-footed albatross | migrant |
| Common murre | resident |
| Scripps's/Guadalupe murrelet* | migrant |
| Cassin's auklet | resident |
| Rhinoceros auklet | resident |
| Tufted puffin | resident |
| Brandt's cormorant | resident |
| Sooty shearwater | migrant |
| Pink-footed shearwater | migrant |
| Northern fulmar | migrant |
| Pacific loon | migrant |
| Long-tailed jaeger | migrant |
| Parasitic jaeger | migrant |
| Pomarine jaeger | migrant |
| Bonaparte's gull | migrant |
| Mew/short-billed gull | migrant |
| California gull | migrant |
| Herring gull | migrant |
| Glaucous-winged gull | migrant |
| Western Gull | resident |
| Heermann's gull | migrant |
| Sabine's gull | migrant |
| Black-legged kittiwake | migrant |
| Caspian tern | migrant |
| Brown pelican | migrant |
| Red phalarope | migrant |
| Red-necked phalarope | migrant |
| Fork-tailed Storm-Petrel | resident |
| Leach's Storm-Petrel | resident |

In addition to the species included in Table 2-5, a few species that are listed under the California Endangered Species Act also have the potential to be present in the vicinity of the Humboldt WEA including the marbled murrelet, Scripps's murrelet, and brown pelican. The marbled murrelet is found in coastal areas of Humboldt County, and the county contains critical habitat for this species. A map of marbled murrelet critical habitat and spring density can be found in **Exhibit 2-5a**. Marbled murrelets are found in higher densities closer to the coast in both spring and summer, but their proximity to the Humboldt WEA means that they may occasionally be found there. The bird density data

for the maps in **Exhibit 2-5** came from the modeling performed by Leirness et al. (2021), which has been made available on the offshore wind energy gateway.[7]

Although the Humboldt WEA falls within the ranges of the Brown pelican and Scripps's murrelet, the likelihood of these species being found in the vicinity is low. Both the brown pelican and Scripps's murrelet are more common in Southern California.

In addition to the marbled murrelet, federal special-status seabirds with the potential to be found in or near the Humboldt WEA include the:

- Ashy storm petrel, which has moderate density along the southern edge of the WEA, with areas of higher density offshore of Cape Mendocino (**Exhibit 2-5b**)
- Tufted puffin, which has high average spring density near Cape Mendocino (**Exhibit 2-5c**)
- Pink-footed shearwater, which has high average fall density and moderate average summer density within and adjacent to the WEA (**Exhibit 2-5d**)

Maps with the average predicted density of these seabirds are available in **Exhibit 2-5**... Generally, special status seabird species are more commonly found closer to the coastline and are not as common in the vicinity of the Humboldt WEA, although this varies considerably throughout the year.

Seabirds without special status under state and federal endangered species laws are much more common within and in the vicinity of the Humboldt WEA. In general, the types of birds that are found in high densities in the Humboldt WEA are gulls, terns, jaegers and skuas. Alcids and cormorants are generally not present in the Humboldt WEA in high densities, but are present in higher densities closer to shore. Seabirds with moderate to high predicted densities within the Humboldt WEA include:

- Black-legged Kittiwake, which has moderate average densities in the spring, and high average densities in the winter. (**Exhibit 2-5e**)
- Bonaparte's Gull, which has moderate average densities in the fall. (**Exhibit 2-5f**)
- California Gull, which has moderate average densities all year, with higher average densities closer to shore. (**Exhibit 2-5g**)
- Cassin's Auklet, which has moderate average densities in the spring, fall, and winter. (**Exhibit 2-5h**)
- Herring or Iceland Gull, which has high average densities in the winter and spring. (**Exhibit 2-5i**)
- Jaeger species have moderate densities in the fall, this is driven by the Pomarine jaeger, which have moderate to high average densities in the fall. (**Exhibit 2-5j and Exhibit 2-5k**)

[7] It is important to note that the predicted densities in Exhibit 2-5 are displayed using a logarithmic scale to enhance the differences between different geographic areas, and that the data is meant to inform long-term average density. There is significant interannual variability in seabird density, and modeling results may not reflect the specific seabird density of any specific year.

- Rhinoceros Auklet, which has highest average densities in the fall, but is present all year. (**Exhibit 2-5l**)
- Sabine's Gull, which has moderate average densities in the spring and fall. (**Exhibit 2-5m**)
- South polar skua have moderate to high average densities in the fall. (**Exhibit 2-5n**)
- Western Glaucous-winged Gull, which has moderate to low average densities all year. (**Exhibit 2-5o**)

**Exhibit 2-5** includes selected predicted density maps for these seabird species and in relation to the Humboldt WEA from different seasons.

Density mapping from 2016 includes predictions of density for all seabirds combined in the vicinity of the Humboldt WEA (Dick, 2016). Following the maps for individual seabird species **Exhibit 2-5p** includes density mapping for all seabird species in the vicinity of the Humboldt WEA for each season. Across all seasons, seabirds are more abundant closer to shore than the Humboldt WEA, and the highest densities of seabirds in the Humboldt WEA occur in the summer.

Kelsey et al. (2018) found that jaegers, skuas, pelicans, terns and gulls have high vulnerability to collision with offshore wind infrastructure due to their flight activity, flight height, and lack of turbine avoidance. These vulnerability estimates were developed using population size, demography, life history, flight heights and avoidance behavior, but did not include a geographic component, so they should be used together with spatial distribution for these species to determine vulnerability to specific projects. In California, the Schatz Energy Research Center at Humboldt State University and H.T. Harvey & Associates is currently working on project, funded by the California Energy Commission, to develop a 3D model to assess seabird risk along the California Coast. The model combines data and information on spatial distribution of seabirds, flight height and power generation to assess tradeoffs between wind farm performance and bird mortality risk. The initial results of this modeling effort should be available later this year. For birds that are attracted to offshore wind development, design elements of the project may be effective at reducing bird attraction, and thus collision risk. Design elements may include reducing areas for perching, or making perch areas unattractive to birds, and designing lighting systems to avoid attracting birds at night.

Much less is known about bat distribution off the California coast. Hoary bats and western red bats, which migrate south along the Pacific Coast in fall, are known to use islands offshore California as rest stops (Stantec Consulting Services Inc., 2018). Other species that are local to the Humboldt area, *California myotis* and *Yuma myotis*, have been observed flying and foraging offshore. Bat activity offshore is highest in late summer and fall during their migration season, although most activity likely occurs closer to shore (Solick and Newman, 2021). Migratory and tree-roosting bats may approach and interact with offshore wind turbines. Like with birds, attraction to turbines increases collision risk for bats, and lessons learned from onshore wind projects have shown that bats are at greater risk of strikes during low wind speeds. One way to address this is to curtail turbine operation and increase the cut-in speed at which the

blades begin to spin. This has been proven to be effective for bats in low-wind conditions, and may not be necessary at higher wind speeds, when the risk to bats is low. Unfortunately, this avoidance technique has not been shown to be effective for birds.

Currently, there are several data gaps that must be addressed to better assess the risk of turbine strikes and bird and bat mortality due to offshore wind development: flight height of birds and bats in the vicinity of the Humboldt WEA, the blade sweep and height of specific projects, and the expected horizontal and vertical movement of the floating turbine. For bats specifically, there is a need for much greater understanding of bat distributions off California, and their likelihood of interacting with offshore wind projects. Future projects that come before the Commission for a consistency certification should provide results from detailed bird and bat surveys of their lease areas including identification of the species that are most likely to be at risk of turbine strikes and mitigation and minimization measures to protect seabirds and bats.

Mooring Lines, Inter-Array Cables, and Entanglement Risk

Under current floating offshore wind platform designs, each platform is stabilized by at least three mooring lines anchored to the seabed. As mentioned earlier in section B, in addition to mooring lines, there will also be many inter-array electrical cables running between turbines and to a substation. From there an export cable would bring the electricity to shore. This is a substantial increase in the number of vertical and horizontal lines and cables in the water, and density of all these lines and cables has the potential to increase entanglement risk for marine mammals. Entanglement risk may include primary entanglement, where animals are entangled in the lines and cables themselves, or secondary entanglement, where other materials such as fishing gear or other marine debris become entangled in lines or cables and these materials then entangle marine animals (Maxwell et al., 2022). Primary and secondary entanglement risk at floating turbines is influenced by a number of factors including:

- The diameter of mooring lines;
- Whether lines are taut or draped;
- The depth of the draping of mooring lines, if they are draped;
- Animal behavior near turbines;
- Detection of mooring lines by animals, which will be influenced by configuration and material used for mooring lines;
- Abundance of lost or derelict fishing gear or other materials in the region; and
- Proximity to fishing grounds

(Maxwell et al., 2022 and Benjamins et al. 2014)

Risk of primary entanglement from offshore wind development cables is highest for marine mammals, but the overall risk to this group is expected to be low, because mooring lines and cables are often taut, and they are of a large enough diameter to preclude easy entanglement of a large baleen whale. Most entangled ropes and lines observed on whales have small diameters – typically less than two inches. Mooring

lines are also made of more rigid material than fishing lines, making the risk of loop creation and subsequent entanglement relatively low (Benjamins et al., 2014). Finally, marine mammal species are likely to detect large-diameter mooring lines either through echolocation for toothed whales, whiskers for pinnipeds, or hearing since ropes produce noise in proportion to current flow (Maxwell et al., 2022). The Humboldt WEA has a greater prevalence of toothed whales as compared to baleen whales, and their echolocation skills are likely to protect them from entanglement in mooring lines. Line detection may occur at a distance of as little as tens of meters and has been shown to occur for toothed whales for much smaller diameter lines than those anticipated with floating offshore wind development (Maxwell et al., 2022).

Large baleen whales have the highest entanglement risk of all marine mammals due to their large body size and foraging habits. Baleen whales forage by feeding with their mouths open, and therefore may become entangled through the mouth and lines may be difficult to remove without human aid. Large whales have also been anecdotally observed using surfaces to rub against to presumably remove parasites or scratch itches (Benjamins et al., 2014). Catenary moorings, due to their long length and slack tension, pose the greatest risk of entanglement, but entanglement has not been reported for oil platforms with similar configurations. Additionally, no primary entanglement has been reported for floating turbines in Scotland since operation began in October 2017 (Maxwell et al., 2022). These results should not be generalized to locations where baleen whales occur in high densities.

Entanglement monitoring such as aerial and drone surveys, remote sensing technologies (e.g., infrared sensors and radar), passive acoustics, animal tagging, underwater cameras, and the use of underwater vehicles to detect and remove marine debris could help mitigate the effects of entanglement on marine species. Future projects will need to evaluate all available monitoring and mitigation options to prevent and minimize entanglement.

The Humboldt WEA is approximately 533 $km^2$ (206 $mi^2$). The most prevalent whale in the Humboldt WEA is the Dall's porpoise, with an estimated density of 0.140945-0.154541 porpoise per $km^2$ (0.054419-0.059669 per $mi^2$). This is approximately 75-82 porpoises within the Humboldt WEA in the summer and fall (Becker et al., 2020). The second most prevalent whale is the Northern Right Whale Dolphin, with an estimated density of 0.032278-0.087714 dolphin per $km^2$ (0.012463-0.033867 dolphin per $mi^2$). This is approximately 17-47 dolphins within the Humboldt WEA. Although the Humboldt WEA has greater densities of toothed whales than baleen whales, the offshore wind energy gateway shows that blue whales occur at high density within a portion of the WEA, ranging from 0.002097-0.005391 whale per $km^2$ (0.0.000810-0.002081 $mi^2$) in the summer and fall, which equates to between 1 and 3 whales within the Humboldt WEA (Becker et al., 2020). Humpback whales occur at densities generally ranging from 0.011105-0.022023 per $km^2$ (0.004288- 0.009503 $mi^2$) or approximately 6-12 whales within the WEA (Becker et al., 2020). In contrast, the density of fin whales in the Humboldt WEA is much lower, ranging from 0.003105-0.00882 per $km^2$ (0.001199-0.003405 $mi^2$) or approximately 2-5 whales across the WEA (Becker et al., 2020). Data for gray whale density is currently unavailable in the offshore wind energy gateway, but maps of potential gray whale presence and migration routes show that gray whales

have the potential to be present in the WEA, but are more likely to be found much closer to shore, along existing migration routes. **Exhibit 2-3** includes summer and fall density maps for selected baleen and toothed whales in the vicinity of the Humboldt WEA, and a map depicting gray whale migration.

In summary, the Humboldt WEA has greater baleen whale density than other locations where floating offshore wind has been installed in the past, and future projects will need to include a robust monitoring program for entanglements.

Secondary entanglement may be a greater risk for a wider range of marine species. Species with large appendages, such as humpback whales and leatherback sea turtles have a greater propensity for entanglement with ropes, lines, or cables, such as those used in fishing gear (Benjamins et al., 2014). If underwater infrastructure accumulates lost fishing gear, such as nets, hooks, lines, or plastic pollution, the infrastructure may create entanglement risks for diving seabirds, sea turtles, sharks and rays, and fish. In turn, fish and other animals caught in the abandoned gear may serve as bait for large predators, like pinnipeds or toothed whales, and bring them closer to debris and increase their entanglement risk. As discussed in the commercial and recreational fishing section below, fishing does occur near and in the Humboldt WEA, and there is a possibility of gear getting lost or snagging on offshore wind infrastructure.

There is lower risk of entanglement associated with the export cable to shore. This cable is expected to be buried, with monitoring that ensures the cable does not surface and create entanglement risk for marine life or gear loss risk for the fishing community. Numerous toothed whales off the Humboldt coast, including sperm whales, dive to deep waters and the seafloor to hunt, so these whales have a potential to be entangled by any submarine cable that is insufficiently buried or exposed. There would also be risk of entanglement during cable installation, as the cable is spooled out from the cable-laying vessel and traverses the length of the water column before it is buried in seafloor sediments. The Commission expects future projects would include actions to minimize entanglement risk during installation in the project design, or the Commission could impose conditions requiring minimization measures, as it has with other cable-laying projects.

The Commission expects applications for future offshore wind development to include frequent monitoring of underwater infrastructure for snagged fishing gear or other materials and removal if the materials are present within appropriate timeframes. To inform these proposals, Commission staff will work with other federal and state agency partners, non-governmental experts and lessees to review available research and develop strategies and best practices that can be incorporated into project-specific construction and operation plans.

Marine Species Displacement, Avoidance, or Attraction

As mentioned above, installation of offshore wind turbines has the potential to change the pelagic and benthic environment in and around the Humboldt WEA. Potential impacts like the artificial reef effect may attract some species to the area, such as those found on natural reefs, and cause other species to avoid the area, such as those found in open water pelagic environments. Similarly, some migrating marine mammal species may choose to go around wind developments rather than through them. In contrast,

other resident or migrating marine mammals, particularly pinnipeds, may be attracted to floating foundation surfaces to haul out and rest, or may be attracted due to the presence of prey species from artificial reef effect discussed above. Very few floating offshore wind projects have been built at this time, and those that exist have been piloting or testing a small number of turbines. Information on the extent of marine mammal avoidance or attraction to a commercial-scale offshore wind project is not currently available.

Above the water, similar displacement or attraction impacts are expected for bird species. Seabird response to offshore wind farms varies by species and may also vary by the specific portion of the wind farm in question. Recent research on lesser black-beaked gulls has shown that birds avoid the inner parts of windfarms, but perch on structures around the edges (Vanerman et al., 2019). Cormorants and gulls are expected to be attracted to the perch surfaces offered by floating platforms and other infrastructure (Maxwell et al., 2022). These birds may take these surfaces as an opportunity for roosting, preening and socializing. In contrast loons, gannets, fulmars, and guillemots are expected to avoid areas developed for offshore wind (Maxwell et al., 2022). Peregrine falcons are also known to be attracted to offshore infrastructure and may use the floating foundations and other structures associated with offshore wind for roosting and foraging (Johnson et al., 2011). Loons, grebes, sea ducks, and alcids also have high habitat displacement vulnerability due to their avoidance behavior around wind farms (Kelsey et al., 2018); however, the research indicating their vulnerability did not include a geographic component, so this information should be combined with local abundances to get a full picture of seabird avoidance. As mentioned above, design features may be built into offshore wind developments that may reduce the project's attractiveness to birds, such as lighting design, minimizing perch areas, and installing features that deter perching for seabirds.

Although much the research and impact assessment above is not specific to California, however, recent research synthesis and species and habitat modeling efforts can provide some insight into which species might be the most vulnerable to habitat displacement or avoidance. The state, through the California Ocean Protection Council has funded two modeling studies to examine geographic areas that would potentially experience greater impacts from development: the first is a study led by the Conservation Biology Institute (CBI) to perform least-conflict modeling for California offshore wind energy planning. The second is a study led by Point Blue Conservation Science to assess and analyze the existing body of information on the marine environment, use key data sets to examine existing wind energy areas and identify additional candidate areas for potential offshore wind development.

Although these studies are in progress, some draft results from the CBI study have been used as a screening tool in preparing this staff report. Species that are abundant in the WEA include Dall's porpoise, northern right whale dolphin, humpback whale, blue whale, gulls, terns, jaegers and skuas. Newer spatial modeling has shown that many seabirds use the Mendocino ridge area south of the Humboldt WEA in large numbers. Most of these species migrate through or feed in the Humboldt WEA. The WEA has seafloor features, including rocky ridges and small portions of submarine canyons that are known to provide foraging habitat for seabirds and toothed whales. Baleen whales

generally migrate through the area, but may forage there if conditions are favorable. There are currently no known breeding areas within the Humboldt WEA for marine mammals or seabirds.

To accurately assess future impacts related to habitat displacement, avoidance or attraction that could occur with installation and operation of offshore wind facilities, comprehensive monitoring of baseline and post-project conditions as well as implementation of adaptive design measures will be critical. Because habitat displacement and avoidance could occur on a scale that significantly exceeds a specific lease area, limiting baseline data collection and post-project monitoring activities to an individual lease area is not likely to be sufficient to assess this type of an impact. Regional-scale monitoring and coordinated project-specific monitoring across multiple lease areas will be necessary to understand how future offshore wind development affects pelagic and benthic environments offshore of California. Furthermore, additional work is needed to identify measures that can be incorporated into the design of individual turbines or fields of turbines that reduce the attractiveness for seabird roosting, whale interactions that could lead to entanglement or other marine species behaviors that could lead to adverse impact. These considerations will be important during regulatory review of specific offshore wind projects.

In addition to offshore development, future potential Humboldt Harbor District development in Humboldt Bay proposed to support the offshore wind industry may also have the potential to impact migratory shore bird species. Humboldt Bay includes large areas of open intertidal mudflats that attract significant proportions of overwintering and migratory shorebird populations. Although exact numbers vary by season, more than half a million birds can occupy the area during peak migration times. Future Humboldt Harbor District development may reduce foraging and roosting space for these shorebirds, depending on where the development occurs within the bay and the scale of development required for the Humboldt Harbor District. Future Humboldt Harbor District development will likely come before the Commission as a coastal development permit, and will need to demonstrate that development is sited and designed to avoid, minimize and mitigate impacts to Humboldt Bay habitats, to the maximum extent feasible. Future Humboldt Harbor District development will also need to consider cumulative impacts of other development, such as aquaculture, in Humboldt Bay that may also impact migratory shorebirds.

Ship Strike Risk

In addition to the lease exploration phase, the lease development phase of the project will bring additional vessel traffic to the Humboldt WEA and thus increase the potential for ship strikes. Because specific projects and operations and maintenance plans are not before the Commission, it is not possible to quantify the amount of vessel traffic that would be expected for construction, operations, maintenance, and decommissioning of an offshore wind farm. However, the Commission expects that lessees will incorporate measures to prevent and reduce ship strike risk, including, but not limited to, reducing vessel transit speed, and using protected species observers and changing vessel course when protected species are observed. As described in the previous section on lease exploration activities, **Conditions 1(f)(i) and 3** incorporate these and other measures into all lease-related activities, and it is the Commission's expectation that

these measures will also be required for all future construction and operation activities.

Elevated Levels of Underwater Sound

Development of offshore wind in the Humboldt WEA has the potential to create elevated levels of underwater sound and impact the behavior of marine life. Installation of floating offshore wind may require pile driving for anchor piles, which are one of several types of anchors. Many other anchor types do not require pile driving and are expected to have minimal noise impacts. Pile driving has the potential to generate high-intensity sound, but existing quieting technologies, such as bubble curtains, can be effective at reducing this sound at its source. BOEM may also require lessees to monitor for marine mammals and other sensitive species and stop pile driving when they are within a specified distance of the site. In addition, consistent with past actions involving pile driving, the Commission may require acoustic modeling and monitoring to further reduce the risk of harm to marine species.[8] The pile driving associated with anchors for floating turbines is expected to generate less sound and have fewer impacts than pile driving of monopile foundations for turbines, like those found on the east coast.

As a new technology, potential effects associated with underwater sound are unknown. Sound during project operations is produced by the rotation of the wind turbine blades and is transmitted to the water by the turbine and its floating foundation and support structures. The US Offshore Wind and the Environment Synthesis of Environmental Effects Research (SEER), which is a partnership of the US Department of Energy, Pacific Northwest National Laboratory, and National Renewable Energy Laboratory, asserts that operations of installed turbines produce relatively low levels of sound that do not significantly exceed natural sound levels (SEER 2021). This assertion is based upon studies conducted on monopile turbines and will need to be tested with the technologies that will be used in the Humboldt WEA.

In addition to operation of turbines, vessel noise and decommissioning activities have the potential to adversely affect marine species. The SEER notes that:

> *Vessel support during operations and maintenance is another source of sound to marine life in the area. Vessel noise can mask the communication signals of marine mammals and certain fish species, and such noise may also induce physiological stress and impair foraging and predator responses in both fish and invertebrates.*

Estimates of vessel trips needed for operations and maintenance is not currently available, and therefore a quantitative assessment of operations and maintenance noise impacts is possible at this time but will be an important component of project-specific reviews. Underwater sound is also expected to be produced in the project decommissioning phase from dismantling or removing various wind farm components, including the turbines, mooring cables, anchors, inter-array cables, substations, and any buried export cables, as well as from vessels support decommissioning activities.

As mentioned above in the lease exploration section, marine mammals and sea turtles

[8] See, for example, CDP 9-17-0531 authorizing replacement of fender piles supporting Casitas Pier in Carpinteria, CA.

are sensitive to underwater sound (see Table 2-2 for injury and disturbance sound thresholds). **Exhibit 2-6** shows where offshore wind-related sounds fall in relation to the hearing ranges of different marine species. For example, offshore wind operational sounds fall within the range of hearing for sea turtles, fishes, whales, seals and sea lions, and dolphins and porpoises. Operational sounds range from around 10 Hz to 1 kHz, and overlaps with frequencies created by earthquakes, wind driven noise on the water, vessels, and pile driving.

A range of fish and invertebrate species are impacted by sound, including by particle motion, sound pressure, and substrate vibration. Particle motion in particular is the main acoustic stimulus for fish and invertebrates and is an important metric to measure to understand noise impacts (SEER et al., 2021). Research has presented possible masking and behavioral changes due to particle motion caused during offshore wind turbine operations, but the research is not conclusive on whether the sound and masking produces negative effects in fish (Siddagangaiah et al., 2021). Fish may adapt to sound created by offshore wind farms (SEER et al., 2021): a study in Taiwan found that offshore wind farm operations increased fish chorusing up to 5-10 decibels in intensity and up to 3 hours in duration (Siddagangaiah et al., 2021).

In the future when lessees pursue specific development proposals, the Commission expects them to provide a robust analysis of the potential impacts that underwater sound caused during construction, operations, and decommissioning will have on marine mammals, fish, invertebrates, sea turtles and other sensitive wildlife. The Commission also expects lessees to design avoidance and mitigation measures into their construction plans, such as planning construction for seasons where whales are less likely to be found in the Humboldt WEA, and using bubble curtains where appropriate. The Commission will also be able to impose any necessary conditions through the federal consistency review process at that time to address particular impacts.

Fish Aggregation, Artificial Reef Effect

Installation of floating offshore wind projects in the WEA, like other artificial structures in marine environments, may act as a fish aggregation device or an artificial reef, particularly in the upper portions of the water column where phytoplankton are present. Artificial structures in the water column have been shown to provide foraging habitat, food sources, refuge from predators, and breeding habitat, thus altering the composition and abundance of wild fish assemblages and affecting fish aggregation behavior (Dealteris et al., 2004).[9] Whether eventual floating offshore wind development is likely to actually contribute to the production of fish populations or simply aggregate fish in the same manner as fish attraction devices (Buckley, 1989; Dempster and Taquet, 2004; Relini et al., 2000) is difficult to determine in advance due to the lack of directly comparable facilities within the same region that can be used for reference. Further, it is unclear at this time how this issue could affect a potential project's consistency with Sections 30230 and 30231 of the Coastal Act.

Because research available is ambiguous regarding the effect that eventual development is likely to have on fish and macroinvertebrate populations in the Humboldt

[9] CC-0003-21

WEA and surrounding area, pre- and post-project monitoring will be critical in determining impacts. Under **Condition 1**, BOEM will work with Coastal Commission staff to ensure that lessees' survey and sampling and analysis plans are coordinated, consistent, and provide the data and information necessary for analysis of future consistency certifications.

Invasive Species

The floating foundations, mooring lines, and anchors that may act as artificial reefs or fish aggregation devices also provide three-dimensional habitat for colonization by fouling organisms and associated biota (McKindsey et al., 2006; Costa-Pierce and Bridger, 2002). A variety of studies indicate that the dominant organisms on submerged artificial structures include algae and attached filter-feeding invertebrates such as sea squirts, bryozoans and mussels (Hughes et al., 2005; Braithwaite et al., 2007*).* Based on overseas research, the assemblages that develop on artificial structures can be quite different from those in adjacent rocky areas (Glasby, 1999; Connell, 2000). Fouling organisms can overgrow native species such as tunicates, sponges, macroalgae, hydroids, and anemones. Maintenance activities for in-water structures and vessels that involve periodic removal of fouling organisms without proper collection and disposal protocols may result in increased dispersal and propagation opportunities for these species. Such opportunities for dispersion and spread pose a particular risk with some algal species that may break apart into many pieces when disturbed, each of which may be capable of surviving, growing, and reproducing on its own.

Eventual development of the Humboldt WEA will include substantial quantities of mooring line, anchor chain, buoys and other infrastructure to secure the turbines and to provide electric transmission between turbines and to shore. These structures provide space for invasive fouling organisms to attach to, and it is not unlikely that non-native fouling organisms could occur at the project site, brought in by hull fouling from vessel traffic or dispersed from nearby sites. The Coastal Commission expects that lessees will identify and incorporate invasive species prevention and minimization measures as they develop their COP. Here again, baseline and post-project monitoring will be an important mechanism for quantifying this impact and assessing the success of measures to prevent and minimize adverse effect associated with invasive species.

Weakened Upwelling

Development of the Humboldt WEA may impact upwelling, an important ocean process in the California current ecosystem. Upwelling drives the productivity of the marine ecosystem off the California coast; it occurs when northwesterly winds blow along the shoreline. Due to the earth's rotation, these winds cause coastal waters to be transported in an offshore direction. This movement of surface water causes cooler, nutrient rich water to rise over the narrow continental shelf to the surface. These nutrient rich waters drive phytoplankton growth, which is the base of the food chain in the California Current ecosystem (Southwest Fisheries Science Center, 2020).

The strength of upwelling varies seasonally, with stronger winds and upwelling in the spring and summer, and weaker upwelling in the fall and winter. Upwelling can also be influenced by bathymetry, coastline topography, and long-term climate patterns such as the Pacific Decadal Oscillation and the El Niño Southern Oscillation. During El Niño

years or “warm” phases, upwelling is weakened, and during La Niña or “cool” phases, upwelling is strengthened.

As mentioned above, upwelling processes are driven by wind. Offshore wind development in the Humboldt WEA is expected to reduce wind speeds and strength and may affect local upwelling strength near the WEA. A modeling study by Integral Consulting, available in **Appendix A**, found that full build-out of wind turbines in the Humboldt WEA would create a very modest reduction in wind speeds in the lee of the wind development, and that little change in upwelling would occur in the immediate vicinity. The researchers found that the relatively small size of the Humboldt WEA limited the impact of wind energy development projects on upwelling in the area. However, as more offshore wind development occurs on the West Coast, the potential adverse effects on upwelling are likely to increase. This is an important area where additional research is needed and a topic that will need to be addressed as the Commission reviews future offshore wind projects, both individually and cumulatively.

Electromagnetic Fields

The inter-array cables and export cables transmitting electricity to the offshore substation and to shore will produce electromagnetic fields via the flow of electricity in the cable. Research has shown that some fish species are magneto-sensitive and use geomagnetic field information for orientation (Maxwell et al., 2022). Long-lived and slow reproducing shark, ray and skate species are of particular concern. Electromagnetic deterrents have been successfully used to repel sharks from fisheries activities to prevent bycatch, but other studies have shown mixed results on changes to shark behavior from EMF (Maxwell et al., 2022). Crustaceans are also believed to have a magnetic sense, but research into the impacts of anthropogenic EMF on these species has shown mixed results (Hutchinson et al., 2020). A BOEM-funded study on in-situ electrical cables, pipes, and benthic habitat found that rock crabs were more frequently observed near the electrical cable in comparison to other habitats, and were present at higher densities than in the natural habitat (Love et al., 2016). However, in a field study where Dungeness crab (*Metacarcinus magester*) and red rock crab (*Cancer productus*) were tested in whether they would cross an electrical cable to access a baited trap found no evidence of effect on the behavior of either species of crab (Love et al, 2017). Magnetic sense is also believed to play a role in salmon migration. A study of salmon smolts swimming parallel to a high-voltage direct current (HVDC) transmission cable moved faster, and while there appeared to be no barrier to movement, misdirection increased their journey to the sea (Hutchison et al., 2020). Currently field studies examining the impacts of EMF on marine species have focused on buried export cables, so there is limited understanding of EMF impacts from cables suspended in the water column (Maxwell et al., 2022).

Understanding impacts associated with EMF is another topic that will require additional research and assessment. Coastal Commission staff will work with BOEM to ensure that lessees’ COPs incorporate instrumentation and appropriate strategies for data collection on many potential impacts relating to offshore wind development, including but not limited to EMF. Collaboration and coordination between lessees and state and federal agencies on how to assess and minimize impacts from EMF will ensure that marine resources are protected, and optimum populations of marine organisms are

maintained.

Monitoring and Adaptive Management

As described in section B., comprehensive monitoring plans and adaptive management strategies for offshore wind projects will be key to ensuring that coastal resources are protected and restored. Significant research has been and continues to be conducted on this topic. In a letter to the Commission, dated March 2, 2022, several environmental non-governmental organizations provided research-based recommendations for potential future monitoring and adaptive management plans related to the protection of marine species and habitats. These recommendations provide a good starting point for discussions on what elements should be addressed in future monitoring and adaptive management plans that will be a critical component of future COP review. These recommendations include:

- Underwater noise: Collection of baseline data and survey, construction and operation noise data on the underwater soundscape to better understand the impacts of additional noise from construction and operations, and to inform turbine micro-siting.
- Secondary Entanglement: Continuous monitoring of mooring lines and inter-array cables for strains resulting from ensnarement or entanglement of an animal or marine debris. Also, design features to minimize the potential for and maximize the detection of entanglement, and protocols to address entanglements that do occur.
- Benthic habitat: Detailed benthic survey of sensitive benthic habitat, including Habitat Areas of Particular Concern (HAPC) to inform buoy placement and siting of future turbines and other development to avoid and minimize impacts to biogenic and sensitive habitat.
- Bird and Bat Impacts: Inclusion of design features to reduce effects from lighting. Also, development of a comprehensive collision avoidance strategy that includes monitoring of collisions and inclusion of collision minimization measures.

Conclusion

The leasing of the Humboldt WEA has a high likelihood of impacting marine habitats, species and ocean processes. There are substantial information gaps about the extent to which the impacts of offshore wind development would occur. At this leasing stage, the impacts from lease assessment activities will be minor to moderate and can be addressed through reducing vessel speeds, having trained observers on board ships, and taking other measures that are required as part of the project or in the Commission's conditions. At future lease development stages, impacts to marine resources are expected to be more significant. Although it is foreseeable that some of these impacts will occur, it is only possible at this time to describe potential impacts at a high level, and more detailed analysis and mitigation will occur through future environmental review and federal consistency review. However, in order to ensure that there will be adequate data on which to analyze future impacts of lease development,

and thus to avoid or mitigate those impacts through appropriate design and adaptive management, it will be important to set up a process for obtaining adequate baseline monitoring, data collection, and assessment of impacts. It is also necessary to ensure there will be adequate coordination between BOEM, lessees, and the Commission to develop the information needed for later BOEM and Commission review of specific projects. **Condition 1** addresses the need for such coordination and development of information. Thus, as conditioned, the proposed activities are consistent with Coastal Act policies related to marine life.

### F. COMMERCIAL AND RECREATIONAL FISHING

Coastal Act Section 30230 states:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Coastal Act Section 30234 states:

> *Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.*

Coastal Act Section 30234.5 states:

> *The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.*

Consistent with previous sections of this report, impacts to commercial and recreational fishing activities will be considered in two settings. First, this section will cover impacts from proposed leasing activities as described in BOEM's submitted consistency determination and EA. Second, this section will consider reasonably foreseeable potential future impacts to fisheries from future development in the wind energy areas offshore of Humboldt. Information used in this analysis incorporates data and information from existing academic studies (including those synthesized in the offshore wind energy gateway and EEMS modeling tool),[10] BOEM and state funded studies, information from east coast offshore wind development documents, data compiled by

[10] CA Offshore Wind Energy Gateway and EEMS Online

the California Department of Fish and Wildlife (CDFW), management information from the Pacific Fisheries Management Council, and other information from NOAA Fisheries.

**Fisheries Management in California**

To fully consider both impacts of leasing activities and the future impacts of offshore wind projects on commercial and recreational fishing, it is important to understand the context and complexity of how California's fisheries (and fishery participants) are managed.

Management of a fishery depends largely on where it occurs. From 0-3 nautical miles from shore, fisheries are generally regulated by the state (CDFW). In federal waters from 3-200 nautical miles from shore, fisheries are overseen by the federal government (NOAA's National Marine Fisheries Service). However, some species that move along the entire West Coast, like sardines, are managed at the federal level even though they are caught primarily in state waters. In certain cases, fisheries are also subject to international regulations and management agreements (such as Pacific halibut, tunas, and salmon) which are then reflected in state and federal laws. The following agencies and organizations are involved in the regulatory and management regime of fisheries of the West Coast:

- Pacific Fisheries Management Council (PFMC): The PFMC manages fisheries for approximately 119 species of salmon, groundfish, coastal pelagic species (sardines, anchovies, and mackerel), and highly migratory species (tunas, sharks, and swordfish) on the West Coast of the United States. They are one of eight regional fishery management councils established by Congress in 1976 through the Magnusson-Stevens Fishery Conservation and Management Act.
- Pacific States Marine Fisheries Commission (PSMFC): The PSMFC was established in 1947 by consent of Congress and is an interstate compact agency that helps resource agencies and the fishing industry sustainably manage resources in a five-state region (California, Oregon, Washington, Idaho, and Alaska: each represented by three Commissioners). Primarily, PSMFC's goal is to promote and support policies and actions to conserve, develop, and manage fishery resources in the aforementioned states by coordinating research activities, monitoring fishing activities, and facilitating a wide variety of projects.
- State Fish and Wildlife Commissions/Agencies: The states of Washington, Oregon, and California are key contributors and partners to the management of commercial and recreational fishing activities on the West Coast. In California, CDFW is the primary state agency that oversees the management and sustainability of CA fisheries and is also a Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the state [Fish and Game Code §§ 711.7(a) & 1802; Public Resources Code, § 21070; CEQA Guidelines § 15386(a)]. CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. While CDFW can promulgate regulations, the principal regulatory body for the state is the CA Fish and Game Commission.

- NOAA's National Marine Fisheries Service (NMFS): NMFS is the federal agency responsible for the management of fisheries in federal waters. The two main functions of the NMFS are regulatory and scientific research. NMFS Fisheries Science Centers conduct a variety of research, observations, and monitoring of living marine resources and their environment, and collaborate closely with regional offices.

The interplay between these different agencies is ultimately reflected in the web of regulations governing fishing activities. There are rules and regulations on nearly all aspects of fishing: rules on what type of gear can be used, where certain species can be harvested, what size they have to be, and at what time of year they may be harvested. Additionally, there are rules for fishing observation, requirements to carry vessel monitoring systems in some (but not all) fisheries, requirements for reporting catch, and much more. All of these elements influence fishing activity before a boat ever embarks on a trip to harvest catch. Adding to these human factors are environmental conditions like sea state, weather, and water temperature that also impact where and when fish are harvested. Thus, as described, fishing and fisheries management is a very complex industry. Not surprisingly, understanding impacts to this complex industry and how it could be impacted by OSW leasing, and later development activities, is a challenging endeavor. This is illustrated by the PFMC in its letter to BOEM on the Draft EA:

> *Section 3.7.1 of the EA states "fishing effort and economic productivity reflect biological productivity and is highest in shallower waters near the coast, generally declining as depth increases." We caution against such a vast oversimplification of how fisheries operate. Important fisheries like tuna (hook-and-line, seine), swordfish (drift gill net, deep-set buoy gear), spot prawn (trap), and sablefish (trawl, fixed gear) have increased economic productivity in deeper waters which tend to be further from shore. Given that most fisheries operating off the West Coast have some form of limited entry, there are impacts which cannot be measured by simply looking at loss of fishing revenues. Permits may lose value based on a loss of access or potential reduction in quota due to stock assessment uncertainty resulting from offshore wind facilities. Most commercial fishing vessels are designed to fish a specific gear type and cannot freely shift effort to another fishery, assuming a permit for that fishery is available. For example, a trawl vessel participating in the groundfish fishery could not switch to the salmon troll fishery and operate in an economically viable fashion. Additionally, many fishermen and almost all processors have portfolios of fisheries designed to fit their vessel's or plant's capacities for fishing or processing. This is in part a hedge against one fishery having an off year. But the main construct behind this strategy is to provide multiple income streams that in total are commensurate with their investment profile and the needs of their staff for employment.*

In short, the information and analysis presented here should be viewed as a starting

point. The data discussed in this document reflect information about fisheries more broadly but cannot fully capture the nuance of fisheries operations for individual operators. To do this will require a robust social and economic analysis to understand what the full suite of impacts are and what measures can be implemented to avoid, minimize, and where necessary, mitigate impacts to the commercial and recreational fishing industry of California.

### North Coast Fisheries Overview

The fisheries of Northern California represent a complex portfolio of species and activities. In general, as described in BOEM's draft EA, the most economically valuable fishery associated with ports in California (including those in Del Norte, Humboldt and Mendocino Counties) is Dungeness crab, which are typically caught in nearshore waters using pot gear during the winter and early spring months. After Dungeness crab, the most prominent fishery activity in Northern California is the groundfish fishery. Made up of a variety of bottom dwelling fishes, rockfishes, and sablefish, the fishery operates year-round and are harvested through a variety of methods including trawling, pot gear, and longline. Fisheries offshore of northern California also include pink shrimp, Pacific and California Halibut, salmon, highly migratory species such as albacore tuna, and coastal pelagic species. Fisheries operate across water depths from nearshore to far into the Exclusive Economic Zone (EEZ).[11]

Fishing activity in the North Coast, as many other places, is defined by significant variation from year to year. On average, however, as stated in the Draft EA, fisheries landings associated with ports on the North Coast average approximately $40 million annually. Many harvesters participate in multiple fisheries throughout the year to ensure a successful business and to allow for adaptive fishing that continues to provide a consistent protein product to buyers and the public.

Within the Humboldt WEA, a subset of the fisheries listed above are active. These fisheries are largely determined by the physical conditions and habitat present. As described in section B, the WEA is a 206 square mile area approximately 21 miles offshore the city of Eureka, measuring 28 miles north to south and 14 miles east to west. Water depths across the WEA range from approximately 500 to 1,100 meters (1,640–3,609 feet). Fisheries that are specifically present in the WEA or include species that have the potential of being harvested in the area, include groundfish, salmon, and highly migratory species, which can be seen in **Exhibit 3-1** (North Coast Fishermen's Mapping Project).

CDFW also tracks fishing data that describes fishery activity in the WEA. At the time of landing, fishermen report their harvest to CDFW based on a system of offshore fishing blocks. These data are limited in some ways, because block sizes are variable (some are very large), they are sometimes mislabeled on reporting forms, and they often do not reflect when species are harvested from multiple blocks or throughout a multi-day

[11] As prescribed by the 1982 United Nations Convention on the Law of the Sea, the EEZ is an area of the sea in which a sovereign state has special rights regarding the exploration and use of marine resources, including energy production from water and wind. It stretches from the baseline out to 200 nautical miles (nm) from the coast of the state in question.

trip, since only one block is recorded for each landing ticket by the receiver purchasing the fish from the fishermen. Generally, the accuracy of the block data decreases the further offshore fishing activity occurs. Although it has limitations, if taken into consideration over a large area, and with other data sets, CDFW's block data can still provide useful information.

CDFW used its block data to identify fisheries that could be affected by proposed and future development within the WEA. **Exhibit 3-2** shows a probable, yet conservative representation of the WEA impact area because it includes areas that are highly likely to be impacted by future project development. This potential impact area identified by CDFW extends significantly beyond the borders of the WEA because the anticipated impacts associated with offshore wind development will also extend beyond these boundaries. In addition to the smaller blocks in the immediate vicinity of the WEA, CDFW included the larger underlying 4-digit block (i.e., block 1041) because many fishermen use this larger block instead of the smaller blocks to record where a catch came from. Additionally, an offshore wind farm cannot exist without a connection to shore, and the farm presents an impediment to fishing on the other side of it, and thus fishing blocks between the WEA and shore need to be included. Finally, development within the WEA could push fishermen outside the WEA and into surrounding blocks and could affect how fishermen transit through the WEA to reach waters further offshore. This area will be referred to as the "greater WEA" so as to make the distinction that the information from CDFW extends beyond the boundaries of the potential lease area. The following subsections will describe each fishery that is present in the North Coast and greater WEA.

Groundfish

Groundfish are a complex of more than 90 federally managed species that includes all rockfishes (about 60 species), thornyheads, lingocod, dover sole and other flatfishes (other than halibut), pacific whiting,12 and some skates and sharks. They are most commonly caught using trawl gear, fished year-round, can occur across various substrate types, and can be caught at a large depth range, from about 20-750 fathoms (120-4500 feet). This is the type of fishing most likely to occur in the Humboldt WEA.

According to data from 2010-2020 provided by CDFW for the greater WEA, groundfish (excluding sablefish and rockfish), represent approximately 48,384,801 pounds landed at an ex-vessel (price paid to fishermen for their catch) value of $25,992,080. After Dungeness crab, it is the most valuable fishery in the North Coast area. When combined with rockfish and sablefish from 2010-2020, this number increases to approximately 60,066,534 pounds with an ex-vessel value of nearly $44,618,665. By volume, it is the highest landed species complex in the North Coast. The groundfish fishery, and bottom trawling in particular, have experienced years of fluctuations and uncertainty due to species depletion. However, beginning in 2019, the fishery experienced a renaissance when an area approximately three times the size of Rhode Island was re-opened off of California and Oregon to groundfish bottom trawling as a result of recovered groundfish populations.

[12] Pacific whiting are primarily caught by mid-water trawl gear. Although the species range extends as far south as Baja California, fishing effort primarily occurs north of the OR/CA border.

*Sablefish*

A part of the groundfish fishery, sablefish (*Anoplopoma fimbria*), also known as black cod (although not a member of the cod family (Gadidae)), is fished year-round off the coast of California, with generally lower catch limits during the winter spawning months. It is managed federally by the PFMC under the Pacific groundfish management plan and in state waters by CDFW. It is primarily caught using fixed gear (baited longlines and baited traps) but is occasionally caught with bottom trawls. Fishermen using fixed gear and trawl equipment are managed under limited entry permits, individual fishing quotas (IFQ) and/or daily trip limits. Although existing data shows that the hook and line/pot fishery generally occurs outside the WEA boundaries, fishing for sablefish can occur at a range of 100-600 fathoms (600-3,600 feet) which overlaps with the depth range of the WEA. **Exhibit 3-3** shows non-catch share hook and line fisheries data near the WEA. **Exhibit 3-4** shows non-catch share pot fishery data near the WEA. NOAA observer data shows the nearest activity occurring north of the WEA.

For the greater WEA, CDFW data (**Appendix C**) indicates that 2010-2020 landings of sablefish represented 7,903,011 pounds at an ex-vessel value of $17,093,207. According to CDFW landings data, in 2019 alone, the Eureka region and Fort Bragg region landings total for sablefish was 775,431 pounds valued at $121,815 and 792,726 pounds at $1,199,030 respectively. Broken down by port, Crescent City reported 105,847 pounds at $208,419; Eureka reported 668,903 pounds at $1,052,309; Shelter Cove reported 78 pounds at $234; and Humboldt Bay reported 604 pounds at $853. In the Fort Bragg region, Fort Bragg reported 784,510 pounds at $1,170,258; Pt. Arena reported 8,216 pounds at $28,772.

*Rockfish*

Also part of the groundfish fishery, rockfish is a general descriptor for a subgroup of approximately 60 species of fish managed under the federal groundfish fishery management plan. Nineteen of these rockfish species are also managed under a “Nearshore Fishery Management Plan” that is overseen by CDFW (California Department of Fish and Game, 2002). There are too many different types of rockfish to adequately describe their unique life cycles and habitats, but they are an important commercial and recreational catch species in the state of California (Northwest Fisheries Science Center et al., 2019).

In the late 1990s/early 2000s, several species of rockfish were assessed and declared overfished, which substantially limited or eliminated the commercial harvest of certain species (such as canary rockfish *(Sebastes pinniger)*, boccacio (*Sebastes paucispinis*), yelloweye (*Sebastes ruberrimus*), etc.). The rebuilding plans for many of these species also included rockfish conservation areas that prevent harvesters (commercial and recreational and/or certain gear types) from targeting species in areas where they are known to concentrate. Rockfish Conservation Areas, or RCAs, are depth-based closed areas. The RCA boundaries are lines that connect a series of latitude and longitude coordinates and are intended to approximate particular depth contours. RCA boundaries are different depending on what types of fishing gear are being used, and they differ between northern and southern areas of the coast. RCA boundaries can also change seasonally and may be changed during the year through in-season actions. The

RCA boundaries are set primarily to minimize incidental catch of overfished rockfish, by eliminating fishing in areas at locations and at times when those overfished species are likely to co-occur with more healthy target stocks of groundfish. RCAs extending along all or part of the West Coast have been in place since September 2002, including a 2,000 square mile RCA located off of Northern California and Oregon. However, as described above, beginning on January 1, 2020, this trawl RCA was removed, re-opening this area to fishing with groundfish bottom trawl gear.

According to CDFW data, rockfish landings from 2010-2020 were 3,778,822 pounds valued at $1,533,378 ex-vessel (**Appendix C**)**.** 2019 (annual) landings values for rockfish species individually and by port can be accessed here.

Skates

Of the skate species off California, longnose skates (*Beringraja rhina*) comprise the majority of fishery and survey catches. No directed commercial fishery for longnose skate occurs in California but they are taken incidentally as bycatch and sold when fishing for other groundfish species, primarily sablefish and Dover sole. They are commonly found at depths ranging from 150 to 400 meters (492 to 1,312 feet). Although found over a wide range of habitats, they are most often found over mixed cobble and sandy sediment on the seafloor. They may live to at least 30 years; age at maturity can range from 5-14 years. When market demand peaked from 1995 to 2001, an average of 75% of skates were landed in the Crescent City and Eureka port complexes. In 2010 and 2011, there was a southern shift in landings with the majority coming from Eureka and Fort Bragg that was likely due to changes in the trawl fishery and market demand (Point Blue, 2022). Approximately 229,701 pounds of longnose skates valued at $55,020 were landed in Eureka in 2019. Commercial harvest of longnose skates occurs during all months of the year off Eureka.

Hagfish

Hagfish is an open access fishery that uses weighted five-gallon buckets to capture the species. No monitoring or reporting in the fishery takes place beyond fish tickets submitted at time of landing. Fishermen target hagfish over soft bottom in depths from 180 to 1,200 ft (55 to 366 m) but mostly fish in depths ranging from 180 to 600 ft (55 to 183 m). The species can be found as deep as 900 meters (2970 feet). Hagfish are landed statewide and there are a greater number of landings off central California due to a larger number of participants, but pounds of fish per landing are smaller by comparison. Fewer, but larger landings occur off the North Coast. In 2019, Eureka reported 203,988 pounds valued at $127,479 ex-vessel, Fort Bragg reported 23,659 pounds valued at $23,504, and all other ports reported114,780 pounds valued at $65,800.

Halibut

There are two species of halibut that are caught offshore of California: Pacific halibut (*Hippoglossus stenolepis*) and California halibut *(Paralichthys californicus)*. Halibut are caught by commercial, recreational and tribal fishermen.

*Pacific Halibut*

Pacific Halibut are a large flatfish that can be found from the Bering Sea to California. They can grow up to 9 feet long and can reach a maximum of 500 pounds. They reside along the continental shelf and can be found along a broad range of depths from inshore out to 450 meters (1,475 feet). They are a popular species caught by both commercial and recreational fishermen. Pacific Halibut are managed jointly between state and federal management bodies as well as the International Pacific Halibut Commission. Pacific Halibut are caught by hook and line (often assisted with a harpoon, gaff and net). The management area associated with halibut catch offshore of WA, OR, and CA is called area 2A (see **Exhibit 3-5**).

The fishery is sub-managed in the following categories:

- Non-treaty direct commercial pacific halibut fishery
- Commercial treaty Indian fisheries
- Incidental commercial pacific halibut fishery during the salmon troll season
- Incidental commercial pacific halibut fishery during the limited entry, fixed-gear sablefish fishery

In 2019, CDFW estimated the following landings and ex-vessel values for Pacific Halibut at ports in Northern California: Crescent City (383 pounds valued at $2,060), Eureka (9,556 pounds valued at $63,596), Humboldt Bay (359 pounds valued at $2,844), Fort Bragg (269 pounds valued at $1,345). Between 2010-2020, CDFW data estimates that the greater WEA area catch represented 12,842 pounds landed at an ex-vessel value of $74,791 (see **Appendix C**).

*California Halibut*

California Halibut are primarily found closer to shore from the surf zone out to 330 feet (100 meters). They can live for up to 30 years and may reach lengths of up to 5 feet. California halibut is a year-round fishery that uses trawls (~50%), hook and line (~25%) or trammel/bottom set nets (~25%). The trawl fishery is currently open from June 16-March 14. The commercial hook-and-line fishery and the recreational fishery can occur statewide (outside of designated protected areas). The gill net fishery is restricted to southern California (south of Point Arguello). The trawl fishery can occur statewide outside of state waters (except trawling inside state waters is permitted in one southern California area). Halibut fisheries regularly occur out of numerous ports from Bodega Bay to San Diego, and periodically extend north to the port of Eureka. In 2019, halibut fishing occurred statewide out of all primary port complexes.

In 2019, CDFW estimated the following landings and ex-vessel values for CA halibut at ports in Northern California: Shelter Cove (238 pounds valued at $1,666), Humboldt Bay (1,983 pounds valued at $13,806), Eureka (3,252 pounds valued at $20,598), Fort Bragg (270 pounds valued at $1,725).

As a note for the statewide landings of halibut: fishing occurs for the species coastwide but is landed in higher quantities in the southern portion of the state due to the presence

of state authorized trawl grounds that do not exist in Northern California. In total, California Halibut landings statewide were approximately 715,005 pounds.

Salmon

Salmon are an anadromous species, living most of their lives in open ocean (federal) waters, but returning to spawn in their natal inland streams. They have a habitat range of 10-1,500 fathoms (60-9,000 feet) and can be found over a broad range of the ocean, although most documented fishing shows activity relatively close to shore **(Exhibit 3-6).** As such, they are managed by the PFMC, which works closely with the state agencies and/or Tribes in implementing commercial, subsistence, and recreational management measures to ensure fishery viability. According to the Fisheries of the United States Report for 2019, California salmon landings totaled 2.9 million pounds and were valued at $16.5 million— an increase of 1.9 million pounds (180%) and $8.8 million (120%) compared with 2018. Chinook (*Oncorhynchus tshawytscha*) salmon were the principal species landed in the state (NOAA, 2019). The average ex-vessel price per pound paid to fishermen in 2019 was $5.59 compared with $7.26 in 2018. As a comparison of overall scale, it is noteworthy that 99% of salmon landings occur in Alaska, with the remaining 1% coming from Washington, Oregon and California.

Salmon are landed from Pt. Conception north to the OR/CA border, and all salmon caught offshore of California must be landed in California ports. Salmon fishing is historically, and culturally, very important, but has been significantly reduced compared to historical levels due, in part, to dramatic decreases in population. Size limits and seasons vary based on the specific management area and are subject to change based on yearly management reviews. Notably and most recently, the commercial ocean salmon fishery was closed in the Klamath management zone in 2021, although the Ft. Bragg area was open to commercial fishing for approximately 47 days. Salmon are predominantly caught by trolling which is a method of fishing where one or more baited (with lures or fish) lines are drawn through the water column behind a vessel. Trolling is not considered a type of bottom contact fishing.

According to CDFW landings data, approximately 57,621 pounds of chinook salmon were landed in the Eureka region in 2019, valued at approximately $328,885 ex-vessel. Of this amount specifically, Crescent City landed approximately 38,726 pounds of chinook, valued at $226,545. Eureka landed 11,725 pounds valued at $65,965, Trinidad landed 773 pounds valued at $888, Shelter Cove landed 4,760 pounds valued at $28,862, Humboldt Bay landed 1,983 pounds valued at $6,396. All other ports accounted for 38 pounds valued at $230 (CDFW, 2019a). Outside of the Eureka area, CDFW tables indicates that 84,426 pounds were landed in Ft. Bragg valued at $474,313, whereas Pt. Arena landed 15,670 pounds valued at $121,216. From 2010-2020 in the greater WEA, 315,592 pounds of salmon were landed at an ex-vessel value of $1,894,584.

Coastal Pelagic Species

Coastal Pelagic Species (CPS) on the West Coast include Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*),

northern anchovy (*Engraulis mordax*), market squid (*Doryteuthis (Loligo) opalescens*), and krill (*Euphausia pacifica*). CPS live in the water column, as opposed to living near the sea floor, at depths from the surface to 1,000 meters (547 fathoms) deep, typically above the continental shelf. NOAA Fisheries and the PFMC oversee the management of CPS in U.S. federal waters off the West Coast. CDFW co-manages the market squid fishery off California with NOAA Fisheries and the Council (market squid is described separately in this section). The primary commercial fishery for CPS is off the coast of California (south of 39 degrees North latitude), however, fishermen in Oregon and Washington also harvest small amounts of CPS.

CPS are commonly caught incidentally with other CPS but are also caught incidentally in some non-CPS fisheries (e.g., Pacific sardine are caught in the Pacific whiting fishery). CPS are primarily caught using "round haul" gear such as purse seine nets, drum seines, lampara nets, and dip nets.

The major West Coast processors and buyers of CPS finfish are generally located in six ports in three main fishing areas: Southern California (San Pedro/Terminal Island and Ventura), Central California (Monterey and Moss Landing), Pacific Northwest/Columbia River area (Astoria Oregon and Westport Washington). Fishing takes place near these ports with minimal fishing taking place between San Francisco and the Columbia River/Astoria Oregon. However, a small live bait fishery has been identified within Humboldt Bay. Overall, between 2010-2020 in the greater WEA, CPS landings totaled approximately 158,773 pounds with an ex-vessel value of $19,049 (**Appendix C**).

Squid

The market squid (Doryteuthis opalescens) fishery is one of the most important in the State of California in terms of landings and revenue. The fishery generates millions of dollars to the state annually from domestic and foreign sales. In 2019, California led U.S. landings of market squid with 27.1 million pounds, comprising 23% of the national total (Fisheries of the U.S., 2019).

Market squid are a relatively short-lived species (approximately 6-9 months lifespan) and generally spawn in 15-180 feet of water depth over sandy bottoms. Fishing for market squid takes place during the spawning events when the species congregates. Landing receipt data from CDFW shows that there is significant variability where squid are caught in California’s waters but generally concentrates to areas south of the San Francisco Bay (CDFW, 2022). This aligns with 2019 CDFW landings data for the Eureka and Fort Bragg regions, which were recorded at 514,532 pounds valued at $257,266 and 0 pounds and $0 respectively. This is approximately 1.9% of the total landings and value in the state. For landings in the port of Eureka this number was 37,054 pounds at $18,527 ex-vessel; Humboldt Bay recorded 198,051 pounds at $99,026; and Crescent City recorded 279,427 pounds at $139,714. Between 2010-2020 in the greater WEA, market squid landings were approximately 4,992,768 pounds at an ex-vessel value of $1,652,651.

Highly Migratory Species

Highly migratory species (HMS) are managed by NOAA fisheries and the Pacific Fishery Management Council as well as through international management such as the

Inter-American Tropical Tuna Commission. Overall, the HMS fishery management plan covers eleven stocks considered the target/managed fishery and eight other non-target species (also known as ecosystem component species). The target HMS managed species include swordfish (*Xiphias gladius*), common thresher shark (*Alopias vulpinus*), shortfin mako, blue shark, yellowfin tuna (*Thunnus. albacares*), skipjack (*Katsuwonus pelamis*), bigeye tuna (*T. obesus*), striped marlin (*Tetrapturus spp.*), dorado (or dolphinfish; *Coryphaena* spp.), bluefin tuna (*T. Thynnus*), and North Pacific albacore (*T. alalunga*). Non-target species include bigeye thresher shark, pelagic thresher shark, common mola, wahoo, escolar, lancetfishes, louvar, and pelagic stingray. These species are generally considered pelagic, meaning they live in the water column (and not close to the seafloor). Abundance of species in an area is highly variable. HMS species often follow thermoclines, which are in a constant state of movement throughout the year.

Highly migratory species are harvested through use of several different gear types. Recreational anglers, including those fishing on Commercial Passenger Fishing Vessels (CPFVs), most commonly use hook and line gear, although some anglers successfully capture HMS using spearfishing gear. Commercial HMS fishing is accomplished through purse seining, large mesh drift gillnet, deep-set buoy gear, longline, trolling, and harpoon. Importantly, drift gillnets are currently being phased out of use in CA waters due to high levels of seabird and marine mammal mortality, with a compliance date of January 2023. Longline gear has been banned for close to two decades in state waters.

The most prominently landed HMS species in North Coast ports is albacore tuna. CDFW landings data from 2019 reports the following: Crescent City (187,957 pounds valued at $115,247), Eureka (171,477 pounds valued $325,151), Shelter Cove (806 pounds valued at $2,279), Humboldt Bay (2,030 pounds valued at $3,078) Fort Bragg (26,266 pounds valued at $59,493), Point Arena (2,653 pounds valued at $11,414). CDFW data for the greater WEA indicates that approximately 924,340 pounds of HMS were commercially landed between 2010-2020, valued at approximately $1,296,885 ex-vessel.

The HMS fishery experiences a high level of observer coverage, and as such, data derived from the fishery is considered to be very accurate (**Exhibit 3-7**). Generally, HMS (albacore trolling) fishing effort is occurring west of the Humboldt WEA.

It is important to note that the information available at the present time is limited to a single species and gear type within the HMS complex. Data from Stephanie Brodie (**Exhibit 3-8**) (processed by CBI) shows that shortfin mako shark, a target species in the HMS complex, may have a moderate seasonal presence outside of the western portion of the WEA, but this is not fishery data.

Dungeness Crab

The Dungeness crab fishery is one of California's oldest and most prolific commercial fisheries and has been regulated by the state since 1895. However, it is currently managed in a tri-state partnership under the Pacific States Marine Fishery Commission. Dungeness crab is primarily a nearshore fishery: the species lives at variable depths from the intertidal zone to 230 meters (750 feet) but is most abundant above 90 meters (295 feet) depth (see **Exhibit 3-9**) and are found predominantly from the Aleutian

Islands to Santa Barbara but can occasionally be found as far south as Baja California Sur, Mexico. Fishing for the species is typically allowed from December 1-July 15, but can vary based on several factors including meat quality delays, domoic acid and human health concerns, and/or the presence of large whales and sea turtles (e.g., humpback and blue whales, leatherback sea turtles). Crab are caught in circular pot gear that can weigh up to 150 pounds. The pot, which sits on the seafloor, has a single line that leads to the surface, marking the location of the gear.

According to 2019 landings data from CDFW, Dungeness crab are the highest value species landed in Fort Bragg (897,908 pounds valued at $3,028,379), Pt. Arena (38,766 pounds valued at $132,870), Crescent City (5,623,572 pounds valued at $19,199,222), Eureka (2,070,472 pounds valued at $6,574,733), and other smaller ports such as Trinidad (576,946 pounds valued at $1,895,746), Shelter Cove (71,099 pounds valued at $236,858), and other ports (536,740 pounds valued at $1,754,263). Only Humboldt Bay (945 pounds valued at $1,365) did not record Dungeness crab as its highest value species. For the greater WEA area between 2010-2020, approximately 29,588,443 pounds of Dungeness crab were landed at an ex-vessel value of $90,189,987.

Pink Shrimp

Pink shrimp (*Pandalus jordani*) are known to inhabit waters from Southeast Alaska to San Diego, CA. The live in relatively deep waters from about 150 to 1,200 feet (45 to 365 meters), aggregating near the bottom during the day in well-defined areas of muddy habitats and ascending into the water column at night to feed-primarily on zooplankton, copepods and krill. Pink shrimp are a relatively short-lived species, with lifespan of around four years. In addition to being a commercially important species, they are prey for a number of other fishes such as Pacific hake, sablefish, spiny dogfish, and other types of skates and rockfish.

Pink shrimp are principally state managed through a northern and southern region divided by Point Conception which is closed from November to April to protect egg-bearing females. The majority of historic landings have been concentrated in Northern California (**Exhibit 3-10**). CDFW estimates that in 2013, approximately 76% of the pink shrimp catch was landed in Crescent City, with approximately 24% landed in Eureka (CDFW, 2019a). Pink shrimp are harvested primarily through benthic trawl gear in federal waters (with required bycatch reduction devices). However, during state outreach to the fishing community, members of the North Coast fishing fleet noted that most landings of pink shrimp are currently taking place in the ports of southern Oregon due to ongoing status changes with the species Marine Stewardship Council certification. However, 2019 landings data from CDFW demonstrate the continued value of species in the north coast. For example, in 2019, pink shrimp were the second most valuable species landed in Crescent City (1,958,660 pounds valued at $1,312,664).

Coonstripe Shrimp

Coonstripe shrimp (*Pandalus danae*) is a relatively new fishery in the state of California. Prior to 1995, it is theorized that any landings of coonstripe shrimp were likely categorized with other species. However, California has the largest directed coonstripe shrimp trap fishery on the West Coast of North America. Most of the fishing activity takes place within a few miles of Crescent City Harbor. Only a few vessels consistently

make landings of the species, which are consistently recorded north of the Humboldt WEA. In 2019, CDFW recorded landings in Crescent City at an ex-vessel value of $598,035 and 99,319 pounds. Between 2010-2020 for the greater WEA, all shrimp and prawn landings totaled approximately 12,485,483 pounds valued at $6,306,513.

Recreational Fishing

Recreational fishing is inherently more difficult to describe than commercial fishing because landings and fishing activity are not tracked in the same manner. Recreational ocean fishing can typically be grouped into two categories: those fishing independently on small boats or from docks/the beach or fishing from Commercial Passenger Fishing Vessels (CPFV). CPFV are for-hire enterprises that take recreational fishers out to fish, but still operate under the quota and recreational regulations associated with their target fishery. Fishing effort in this sector is generally managed through surveys or on the dock fish counts. According to the 2019 Fisheries of the U.S. report, the most popular species targeted by fishers on the West Coast were rockfishes, albacore tuna, lingcod, halibut and salmon.

Pacific coast-wide in 2019, marine recreational anglers took an estimated 3.8 million trips and caught a total of more than 11 million fish. Almost 90 percent of these trips were made in California, followed by approximately 6 percent in Oregon, and 4 percent in Washington. The most commonly caught (as opposed to targeted) non-bait species (in numbers of fish) across all trips were Pacific (chub) mackerel, kelp bass, black rockfish, California scorpionfish, and vermilion rockfish. The largest harvests by weight across all trips were albacore, lingcod, black rockfish, Chinook salmon, vermilion rockfish, and coho salmon. Approximately 71% of trips occurred in state waters, 17% in federal waters, and 12% in inland waters. Of those trips that fished primarily in federally managed waters, the non-bait species most commonly caught (in numbers of fish) were California scorpionfish, ocean whitefish, vermilion rockfish, squarespot rockfish, and bocaccio. Other popular recreational catch, particularly on CPFV vessels are salmon and halibut (Fisheries of the U.S., 2019).

Recreational fishing typically uses smaller scale fishing methods, such as hook and line, trolling, hand nets, or occasionally harpoon. With limited exceptions, recreational fishing is generally a nearshore activity due to the limited trip lengths, smaller size of vessels, weather conditions, and cost. One recreational fishery that does operate further offshore in the North Coast region (as shown in the commercial albacore trolling data included in **Exhibit 3-7** is the tuna fishery.

Social and Cultural importance of Fisheries

Aside from the economic importance of fisheries described above, fishing activity is also interwoven into the societal and cultural fabric of communities up and down the coast. Modern fishing has been a part of the North Coast community economy since it was founded in the 1850’s gold rush but had been an integral part of the indigenous coastal communities since time immemorial (Pomeroy et al., 2011). Fishing communities and the infrastructure associated with them provide jobs and amenities to the surrounding community, as well as promote a broader connection with the public to the ocean. For

Tribes and other entities that rely on fisheries for subsistence, access to even a small quantity of fish is important for food security and to the continuance of cultural traditions. Thus, even those fisheries that make up a smaller component of the overall economic value in the north coast (such as salmon) may still be critical to the existence and identity of an area, even when value or poundage of landings itself conveys a less substantial role.

**Lease Exploration Impacts**

During the leasing period, a lessee may conduct lease exploration activities within the WEA including shallow hazards assessments, geological, geotechnical, archaeological, and biological surveys, and installation, operation, and decommissioning of data collection buoys. These activities have the potential to interfere with commercial and recreational fishing in and offshore of Humboldt Bay primarily through impacts to important fishery species and space-use conflicts within Humboldt Bay and offshore.

Data collection buoys may exclude fishing operations that frequent deeper water, particularly bottom trawl fishermen, as mobile gear fishing is not generally compatible with fixed structures. Mobile fishing is typically defined as any operation with active gear such as nets or dredges that are set out and hauled back with winches or drums while the vessel and gear are underway, typically on a cycle measured in minutes or hours. Using this type of gear significantly hinders a fisher's ability to maneuver their vessel during operations, including around structures that are affixed to the seafloor, such as buoys. Fishermen could also suffer decreased efficiency (such as spending more time on fishing by setting and hauling gear) when trying to avoid buoys during their operations. Decreased efficiency can result in increased time at sea, fuel expenses, and additional wear on equipment. The spatial extent of de facto exclusion from fishing grounds may be estimated (as a proxy) using USCG safety zone considerations for OCS facilities where 500-meter (1,640 feet) safety zones were established to promote the safety of life and property.[13] Using this approach estimates a 0.785 $km^2$ (0.303 $mi^2$) circular exclusion zone per buoy. Although the exclusion area itself is not very large, avoiding this area could mean that fishermen have to modify fishing activity or transits to continue fishing and navigating safely. If fishermen fail to avoid buoys, subsequent entanglement may result in damage to or loss of fishing gear for which they could be held financially liable. Other fisheries operating within the WEA may also be affected by buoy placement, but the impact is expected to be minimal because the relative effort of non-trawl fisheries is comparatively low in the WEA, and the deployment and retrieval of other gears may have more maneuverability compared to trawls.

As described above in more detail in section E, sampling or site assessment activities may result in adverse impacts to fish and other marine species that could lead to an indirect impact on commercial or recreational fishing. Geophysical surveys that use acoustic methods may negatively impact fish in the larval stage as well as have negative impacts on the ability of fish to hear within the water column. To address this concern, BOEM has clarified that high-energy acoustic surveys are not assessed in the EA and will not be authorized as part of a lease, and as such, impacts to fish species are not expected to be significant. Furthermore, **Condition 1(c-e)**] requires geophysical

[13] 33 CFR §147.1109

surveys to be conducted using low-energy equipment, including subbottom profilers, echosounders, and side-scan sonars, and requires BOEM to encourage lessees to collaborate on their survey plans to increase efficiency and minimize impacts to coastal resources associated with the surveys. In addition, survey vessels could disturb important seafloor habitats or accidentally release oil or other hazardous materials into the ocean. As described in more detail in section E, **Conditions 1(f) and 2** require BOEM to ensure lessees avoid hard substrate habitat and submit a variety of plans, including an Anchoring Plan, a project-specific Spill Prevention and Response Plan and a Critical Operations and Curtailment Plan to ensure that vessels operate safely and avoid impacts to the marine environment. In addition to data collection buoys, site characterization and assessment activities may result in conflicts to the hundreds of marine operations and fishing vessels located near Humboldt Bay and the WEA. Proposed lease exploration activities involve survey vessels mobilizing and transiting from port (which BOEM has assumed to be the Humboldt Harbor District as it is the nearest deep draft port to the WEA) to the WEA. The expected number of trips related to the survey and leasing activities is 130-178 for 24-hour ops and 448-496 for 10-hour ops. The addition of more vessels into the area may reduce efficiency of fishing operations due to time delays associated with congestion. In addition, vessels associated with the leasing activities 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. Nearshore fishing activities may be further impacted due to the presence of survey vessels conducting site analysis or fish surveys (for example) along potential cable routes. It should be noted, however, that both lease exploration activities and placement of buoys are a temporary impact, which will conclude after approximately 5 years and result in the removal of any installed metocean buoys that may have been anchored to the ocean floor.

Typical mitigation measures to reduce the previously described space-use conflicts focus on avoidance and procedures to increase navigation safety. For example, vessel operators are required to comply with regulations regarding pollution/discharge at sea such as those under the Federal Water Pollution Act which regulates the release of oil at sea, and those under the Clean Water Act, which regulates the discharge of pollution at sea, and the Marine Pollution Convention (Annex V) which regulates discharge of trash at sea. These requirements reduce the likelihood of discharges into the marine environment and ensure that if any accidental releases of trash and debris do occur, the operator is responsible for reporting spills as appropriate, recording authorized discharges, and held accountable through violations and fines if found not to be in compliance.

Furthermore, at the end of the approximately 5-year lease exploration term, data collection instrumentation will be decommissioned, and large marine objects removed so any existing de facto exclusion zones will be eliminated. To enhance navigational safety, lessees will develop survey plans and SAPs that will include site-specific measures to mitigate navigational concerns. Such measures may include a local notice to mariners, designation of vessel traffic corridors, lighting specifications, incident contingency plans, or other appropriate measures. According to BOEM, survey development is an ongoing process, and each survey plan will be carefully evaluated,

not only for scientific rigor, but also incorporation of best management practices to ensure measures are taken to minimize impacts to fish species, mammals, and to promote save navigation.

In authorizing similar marine survey or infrastructure projects, the Commission has typically required a series of mitigation measures to reduce or eliminate impacts to fishermen and fisheries resources. Many of these measures are similar if not identical to those required by BOEM. For example, communication with the maritime industry, updating nautical charts and providing notice to mariners are commonly incorporated measures. However, the Commission has also typically included a few additional measures that are not currently included in BOEM's proposed activities. These include specific prohibitions on contact with hard substrate, a submission of several emergency response plans such as spill, anchoring, and critical operations and curtailment (**Conditions 1(f) and 2**).

To ensure these measures are implemented, **Condition 1(a-b)** states that BOEM will encourage continuous and open communication and dialogue between BOEM, the lessees, the Coastal Commission, and other relevant state agency staff during review of survey plans and sampling and analysis plans; BOEM will also coordinate with the Coastal Commission and other relevant state agencies to provide access to the lessees' survey plan submissions. Additionally, **Condition 7** will require continued close coordination with members of the fishing industry, primarily through the use of a fishing liaison, to ensure that timing of surveys is considered (i.e.; in relation to fishing seasons) as well as ensuring proper channels of communication are in place to minimize potential on-water conflict. With these measures included and as described above, the proposed lease activities will be implemented in a manner that recognizes and protects the economic importance of marine resources and commercial/recreational fishing and are therefore consistent with Sections 30230, 30234, and 30234.5 of the Coastal Act.

**Future Lease Development Impacts**

As described in section B, the purpose of this section is to identify and assess reasonably foreseeable impacts associated with potential future development of offshore wind leases. At this stage, there is not enough information to conduct the type of comprehensive and cumulative socioeconomic analysis for potentially impacted fisheries that will be necessary to evaluate specific projects. However, there is sufficient information to conduct a siting-level analysis that incorporates information on the size of the wind area and the maximum potential build-out capacity, development and infrastructure likely needed to support offshore wind development, the types of fisheries present that have a potential to be impacted, and different strategies that have or could be employed to ensure that impacted fishing communities remain protected, viable and resilient.

As described earlier in this section, the waters offshore California support numerous types of fishing, and there is a high cultural and economic significance associated with these activities. In its EA, BOEM identified the fishing grounds for sablefish, dover sole, thorny heads, chinook salmon, and hagfish as overlapping with the WEA. Apart from salmon and hagfish (which is an open access fishery), these fish are typically associated with the groundfish fishery, which is considered the second-highest value

fishery in the region. BOEM's finding is consistent with CDFW data presented in the first section. Other fisheries present within or near the WEA include tuna and other highly migratory species. Dungeness crab, the highest value fishery in the region, is fished at depths of less than 230 meters (i.e., closer to shore) and does not have an identified overlap with the WEA, although could be impacted by cable routes and other lease development activities that would occur closer to shore. Impacts to fishing from potential wind development are complex and will vary on a fishery by fishery, and even individual basis. However, there are common potential impacts that have already been identified and articulated by the industry.[14] These include:

I. Exclusion. The ocean is a shared space. Fishing and other uses must coexist and work through complex management and regulatory requirements. It is anticipated that offshore wind development areas will become exclusionary zones and will restrict already limited ocean space even further.

II. Displacement. Related to Exclusion, fishers that are excluded from the WEA may be forced to relocate into other, already limited fishing grounds, placing additional environmental pressure on the remaining habitat, and potentially increasing conflicts between user groups.

III. Increased costs and time at sea to avoid wind development. Placement of wind facilities can delay direct access to fishing grounds and force fishers to fish or drift far outside of lease boundaries due to movement of gear and vessels on the open ocean.

IV. Loss of future fishing grounds. Fishing grounds are highly variable. Continuous and often rapid changes in ocean conditions cause changes to fish populations which in turn result in changes to fishing behavior year over year. Large-scale wind development would eliminate a huge portion of potentially viable fishing area, limiting fishermen's ability to adapt to changes in fishing grounds.

V. Loss or disruption of harbor space and fishing infrastructure at ports due to increased presence of wind related facilities.

Each of these impacts will be explored further below.

(1) Exclusion

There are currently a multitude of protected and/or conservation areas in both state and federal waters that specifically impact when and where fishing can take place. These areas, which include Essential Fish Habitat (EFH), Habitats of Potential Concern (HAPCs), Marine Protected Areas (MPAs) and National Marine Sanctuaries, also affected the siting of the WEA itself. Essential Fish Habitat (EFH) designates areas important for fish spawning, breeding, feeding or growth, and can include full or partial fishing closures, especially for groundfish. The WEA does not contain EFH-related closures, but nearby EFH areas include Trinidad Canyon, Mad River Rough Patch, Eel River Canyon, and Samoa Deepwater (**Exhibit 3-11**).

[14] These concerns were brought forth by the fishing community during interagency outreach meetings, as well as derived from a list of concerns submitted by numerous fishing organizations in a public comment letter. The impacts have been summarized in this document, but the full list of concerns/potential impacts can and should be considered in the scope of future project development.

A Habitat Area of Particular Concern (HAPC) is a discrete subset of Essential Fish Habitat (EFH), which designates areas that provide extremely important ecological functions or are especially vulnerable to degradation. Within and around the WEA, there are several rocky reef HAPCs, shown in **Exhibit 3-12**. Marine Protected Areas (MPAs) designate important marine habitat areas and may include fishing closures. There are 20 protected areas in this region offshore of Mendocino, Humboldt and Del Norte Counties that cover approximately 137 square miles and include six special fisheries closures (CDFW, 2019b). There are currently no (federal) national marine sanctuaries in the vicinity of the WEA.

The protected area exclusions described above are just one example of fishing exclusion. Certain types of fishing areas are also limited by seasonal closures, depth limitations, gear restrictions, and quota limits, which affect the amount of allowable catch. These limitations result in much smaller areas in which fishermen are able to continue to harvest catch. This is partially illustrated through a story map created by North Coast fishermen as part of the North Coast Fisheries Mapping Project.[15] Using this tool, you can see the potential areas of groundfish fishing, but also see the totality of areas closed to fishermen due to various habitat and other exclusions (**Exhibit 3-13**).

On top of the exclusions described above, offshore wind development within the WEA would result in an additional up to 206 square miles closed to fishing for at least the next three decades and likely longer. Based on a review of current fisheries data, several different fisheries could be affected by exclusion from the WEA, but the groundfish fishery, and bottom trawl fishery specifically, have the highest likelihood of being directly impacted by offshore wind development in the Humboldt WEA. Other potentially directly impacted fisheries include salmon, hagfish, and HMS. While fishing for salmon could potentially occur in the WEA, based on the expansive range of the species, most documented fishing activities for the species occur in closer proximity to the coast. In addition, because trolling gear and fishing techniques are more flexible, it is not certain that salmon trolling would be wholly excluded from the WEA. Hagfish activity is also reported closer to shore (Fishermen's Mapping Study, 2022), although the depth range of the species overlaps with the WEA. With respect to shrimp fishing, the pink shrimp fishery range is shallower than the current boundary of the WEA, and the coonstripe shrimp fishery is also not likely to experience significant impacts from the leasing activities associated with the Humboldt WEA given its close proximity to shore. Finally, with respect to HMS, it is anticipated that this fishery (both commercial and recreational) could be impacted by the presence of wind development because it will inhibit direct access to fishing grounds offshore of the WEA from the nearest port at the Humboldt Harbor District. Additionally, given the variability of the temperature margins that HMS species follow, it is possible that the species distribution could overlap with a physical location of development. However, it is possible that certain gear types used by the HMS fishery, such as trolling, could be compatible with development, so the exact extent of impacts is currently unknown.

In contrast to these fisheries, data presented in this section demonstrates that the

[15] (North Coast Fisheries Mapping Project (arcgis.com)

bottom trawl fishery has a strong documented presence, especially in the southern and eastern portions of the WEA (see **Exhibits 3-14 and 3-15**). As described in the fisheries description above, groundfish bring in the greatest volume of landed species in the North Coast area and are second in value to Dungeness crab. Exclusion (as described above) and the likely resulting displacement of this fishery could have significant potential impacts on North Coast fishing activities and landings more broadly.

Bottom trawl activity is significantly limited in terms of area in which it can be fished and is already excluded from state waters, offshore federal waters outside of 700 fathoms (1,280 meters or 4,200 feet), and in many conservation areas throughout the state. Further limiting the area available to this fishery would have direct negative economic impacts to trawl fishermen, as well as indirect negative impacts on other fisheries. An analysis of 1997-2015 trawl log data was conducted by CDFW that overlayed fishermen reported trawl sets with the WEA and correlated them to existing catch data (**Appendix C**). The CDFW analysis, which processed trawl logs to include fish actual weight and value derived from the corresponding fish tickets, showed that for the entire time period, an average of approximately $224,000-450,000 annually has been derived from the WEA by the trawl fishery. Between 2010-2015, this average was approximately $423,500-739,000. During the 2010-2015 time period, this represents approximately 11.9-20.7% of the trawl catch as being harvested from the WEA compared to the greater WEA (**Exhibit 3-2**).[16] These values indicate that areas within the WEA are economically important to the trawl industry. Feedback received from the fishing industry during outreach meetings also identified the WEA as an important location for groundfish trawling.

In addition to this information, there is a study (undergoing internal review prior to being submitted to a peer-reviewed journal) prepared by Wang et al. This study uses 2010-2017 VMS data combined with state landings data to calculate different fishery metrics to estimate relative levels of groundfish fishing activity taking place inside the WEA boundary and across the state. These metrics include total catch, total ex-vessel value, as well as catch per unit effort and value per unit effort for groundfish within the Humboldt WEA, the Morro Bay WEA, and across the state. An initial review of this study suggests that it may correlate to the CDFW data described above and should be closely considered upon finalization.

(2) Displacement

Displacement occurs when fishermen can no longer access historic grounds and instead seek fishing opportunities elsewhere, which can overlap and lead to conflicts with other fisheries. The impacts associated with displacement can be difficult to quantify, especially in areas like the North Coast where fishing activity that takes place in and around the area may not be landed at one of the North Coast ports (i.e., Crescent City, Eureka and Fort Bragg), but in more distant ports, such as Newport, OR or further south in Bodega Bay or San Francisco. Or, even if fish are caught and landed in the North Coast, it is often the case that a significant portion of the fishing vessels are

[16] Trawl log submission compliance for this time period varied, but was below 100%. According to CDFW scientists, these figures most likely represent the minimum values extracted during the time period analyzed.

homeported outside the region, making it difficult to track impacts associated with displacement.

For offshore fisheries such as groundfish, salmon, and HMS, development within the WEA could result in the need to relocate to other fishing grounds that are less valuable, further away or already in use by other fishermen, if adequate fishing grounds are available under current environmental and regulatory conditions. Displacing fishermen into fishing grounds that are further away could result in increased costs related to time and fuel, and safety risks resulting from fishing further away from port, or close to wind facilities.

Nearshore fisheries, such as Pacific and CA halibut, market squid and Dungeness crab, that are caught in waters primarily inshore of the WEA, are not expected to experience direct impacts from offshore wind turbines in the WEA but may be displaced by related development. Offshore wind development will require power cables and other infrastructure to bring the power onshore. Construction and operation of these cables can adversely affect fishermen through temporary displacement or interference during construction, and as an ongoing hazard especially for fishermen using bottom contact gear. For example, fishermen using trawls or other gear that has bottom contact run an increased risk of snagging on the cable and losing or damaging gear. For some previous fiber optic cable projects, fishermen and cable companies have agreed to a “no fishing” buffer around the fiber optics cables in order to minimize potential interaction and snags. In addition, nearshore fisheries are likely to be competing for space with other fisheries that have been displaced. The nearshore area directly offshore of Eureka/Humboldt Bay supports some of the highest density crab fishing grounds in the North Coast, and this is certainly a concern for this and other nearshore fisheries.

For the recreational sector, the presence of fishing within the WEA is relatively limited. It is possible, however, that development within the WEA could inhibit access to fishing grounds for highly migratory species, such as albacore tuna. There is significant variation with the location of fishing for HMS activity due to the variability of temporal habitat. However, the general trends of the fishery appear to be offshore and to the west of the WEA, which suggests that the recreational (as well as commercial HMS fishery) is not likely to be immediately displaced from its fishing grounds. As future conditions shift, conflicts could occur.

(3) Increased costs and time at sea

The potential development of wind facilities offshore of Humboldt Bay could result in increased time (and therefore cost) of being at sea for many fishermen. Displaced fishermen may need to travel further away to achieve the same catch. This could mean much longer trips in and out of ports, which increases fuel costs, vessel wear and tear, and potentially the number of overall trips a vessel could take due to time on the water. The simplest way to describe this is through an example. As shown in **Exhibit 3-7**, the albacore tuna fishery is active primarily on the western side of the WEA. Currently,

fishing that takes place from the Humboldt Harbor District/Eureka would access fishing grounds through a direct route.

According to the data from the fishermen's mapping study (**Exhibit 3-16**) it currently takes approximately 6+ hours to access the west side of the WEA. If fishermen are no longer able to take a direct route through the WEA, but instead have to go around, that can add at least one or more hours to the trip depending on the wind facility layout. That additional transit time adds fuel costs, and reduces the amount of time the fishermen spend actually fishing (depending on the fishery). More time to access fishing grounds can ultimately result in an overall reduction of trips that a vessel is able to take. Less trips generally equate to less overall harvest, or in the case of recreational/CPFV fishing, less business. Vessels also report that in circumstances where the vessels remain at sea overnight, a vessel can drift as far as 10 nautical miles. This would mean that fishermen in this situation would need to leave a 2-hour buffer from the farm to ensure that they were not placing their vessels or persons at risk of collision.

Finally, many fishermen have brought up the fact that fishing around wind development will require additional space beyond the boundary of the WEA. Certain types of fishing gear, such as a sablefish pot, drift horizontally in the water column before it reaches the bottom. The horizontal distance travelled varies with ocean conditions, but can drift up to a mile from where it was set. If fishing in or around a wind facility, this would add a mile buffer around the entire perimeter of the lease area that would also be considered unfishable (subject to an individual fishermen's assumption of risk).

(4) Loss of future fishing grounds.

Fishing is a highly variable vocation, and as such, the construction and operation of a stationary offshore wind facility and its associated infrastructure have a high probability of impacting the ability of fisheries to adapt to the changing spatial-temporal conditions that define fishing. This makes predicting the exact potential for loss of future fisheries as a result of wind development extraordinarily difficult. As an example, **Exhibit 3-7** (albacore tuna density data) shows the significant degree of variability in the locations where fishing takes place year after year. Fishing activity, especially for HMS fisheries which vary seasonally in relation to water temperature, are already difficult to predict year to year with precision. When coupled with broad scale predictions and uncertainty related to climate change, including expectations that species will shift north with warming water trends, it's nearly impossible to say with precision what fisheries will look like in the future. However, given the realities of a warming ocean and climate change, it is highly likely that future fishing grounds will be different than they are today.

A potential loss of future fishing grounds could apply to multiple fisheries, whether or not they have occurred in the WEA in the past. This includes the HMS fishery, ocean salmon, groundfish, and hagfish (an open access fishery). The North Coast Fishermen's Mapping Project,[17] which mapped potential future fishing grounds in the North Coast

[17] North Coast Fisheries Mapping Project (arcgis.com): A similar exercise is occurring for central coast fisheries.: A similar exercise is occurring for central coast fisheries.

(see **Exhibit 3-1**), shows potential overlap of the WEA with these fisheries ranges, even though current activity may not reflect actual fishing presence due to management constraints or abundance of species. A loss of area to use for future fishing operations makes it more difficult to adapt fishing operations over time, and as such, business planning for successful years of operations takes on a higher level of uncertainty. This uncertainty can also expand to related fishing businesses such as processors and wholesale retailers. As aptly explained in a public comment letter on the Draft EA from West Coast Seafood Processors Association:

> *Seafood processing and seafood buying depends on more than one fishery so companies can stay open year-round and maintain the markets they have cultivated over several years, sometimes decades. Processors can offer their customers a variety of products to suit their needs. The success of seafood businesses is dependent on year-round income and the ability to avoid experiencing a downturn due to fish availability, changing ocean conditions or other natural events. The cyclical and seasonal nature of some fisheries demand the processor adapt to retain a skilled work force. Disruption to this business model will likely lead to failure of businesses.*

(5) Loss or disruption of harbor space and fishing infrastructure at ports due to increased presence of wind related activities and facilities.

Offshore wind development in the Humboldt WEA will require substantial port and harbor space to support assembly and staging of turbines and other equipment. There are a few existing and ongoing studies examining feasibility of various ports in the North Coast, and in other parts of the state, to serve as a support base for the offshore wind industry. In the North Coast, the most likely candidate to support this type of development is the Humboldt Harbor District (Eureka). However, to serve this purpose, the Humboldt Harbor District will require significant upgrades and new facilities. As these studies are ongoing, the scope and scale of upgrades needed to support offshore wind infrastructure on the north and central coasts, and thus any coastal resource impacts that would result from those upgrades, is uncertain. However, examples from the east coast can provide some information that can assist in describing potential impacts.

As noted above, staging for offshore wind and the associated pier/berth facilities can take up a significant amount of space. In the Port of New Bedford, which is an urban port in Southeastern, MA being developed as a staging area for (currently) two offshore wind projects, a 29-acre site is being developed on an existing waterfront site. Features of the New Bedford OSW marine terminal include:

- Co-location with more than 200 maritime businesses
- 29-acre facility, including 21-acres of heavy-lift capacity: uniform loading up to 4,100 pounds/square foot and crane loads of up to 20,485 pounds/square foot
- 1,200 feet of bulkhead, including 800 feet of deep draft berthing and 400 feet of barge berthing space
- Within the most protected port in the U.S., with the U.S. Army Corps Hurricane Barrier that guards against storms up to Category 3 hurricanes

- No height restrictions on site, and no overhead restrictions from the Terminal to open water
- Easy roadway connections to interstate highway system via I-95 or I-495 (via connections through New Bedford Route 18 and MA Route 140 and/or Route I-195)
- No Harbor Maintenance Tax

In terms of fishing, New Bedford is considered one of the most economically valuable fishing ports in the country supporting more than 100 (homeported) vessels and landing more than a million pounds of seafood a day (Commercial Fishing, 2018). It is home to vessels, processors, wholesalers and restaurants that all rely on the industry. The incorporation of the offshore wind site in New Bedford is on an existing developed parcel, and part of the design includes expanded seafood offloading facilities. An important distinction between the two coasts is that the wind turbines on the West Coast have the potential to be much larger than those used on the east coast, and thus, the space needed to stage them (and the vessels needed to transport them) will likely have to be larger.

For the fishing industry, expanded development within the Humboldt Harbor District can result in additional concerns related to traffic, loss of port and harbor space and facilities. For example, in the Humboldt Harbor District, traffic on the water is generally limited to a dredged main channel that can support vessel drafts of commercial vessels. Large vessels, such as those needed to transport turbine structures could prevent other vessels from transiting in the safety of the channel and delay in and outbound Humboldt Harbor District transits when they are operating. It could also force vessels to operate outside of the main channel, which may harm sensitive natural resources in the bay such as eelgrass. However, as noted in the industry letter received on February 9th, 2022, there can also be some benefits of Humboldt Harbor District co-location such as decreased fuel prices and even general harbor space improvements/repairs. Keeping this siting information in mind, it will be important to consider the location of offshore wind staging within the harbor, overall spatial requirements, and the additional impact minimization measures that can be incorporated into the design that could lessen impacts to the fishing industry and thus be consistent with Coastal Act Section 30234.

**Coastal Act Analysis and Approaches to Avoidance, Minimization and Mitigation**

As described in detail in the previous sections, activities related to offshore wind leasing and foreseeable future development within the Humboldt WEA will result in impacts to the fishermen and fisheries of California's North Coast. Several fisheries, and especially the bottom trawl groundfish fishery, currently overlap with portions of the WEA and would likely be excluded from these areas if offshore wind development is authorized. To varying degrees, all North Coast fisheries would likely be affected by temporary or permanent displacement, increased cost and time at sea, traffic, loss or disruption of harbor space and fishing infrastructure within the port and potential loss of future fishing grounds. As described above, some of these effects would be felt directly and immediately with lease exploration activities. Other effects would be felt later in time—likely in the context of lease development activities—but are still reasonably

foreseeable and need to be analyzed and addressed, at least at a broad scale, at this point in time. In addition, the leasing action itself will have immediate effects on fishing because it creates uncertainty for fishermen about where they will be able to fish in the future, which affects their ability to conduct longer term financial planning, such as deciding whether to take on debt to purchase new equipment. Communications with the fishing industry during outreach activities and through comments on the BOEM draft EA reiterate this concern.

Although the exact impacts of future wind development are not known at this time, there are immediate and reasonably foreseeable future effects that need to be addressed in order to protect the economic and commercial importance of fishing activities, as required by Coastal Act Sections 30234.5 and 30230. The North Coast landings averaged $43 million annually, accounting for approximately 26% of commercial landings statewide[18]. This value, while significant, does not fully address the economic value of fishing crews, fish processors, gear manufacturers, ship supply and repair businesses, seafood retailers and restaurants in the North Coast and beyond. As such, the high-value fishing grounds in the North Coast and the species that are fished there can be considered areas and species of special economic significance that garner specific protection under Section 30230. In particular, the trawl fishery, which contributes a significant portion of the overall catch landed in the North Coast and is likely to experience the most significant direct impact, deserves special consideration.

The Coastal Act requires the protection of commercial and recreational fishing activities, and there are a variety of actions that could be taken to ensure that California's North Coast fishermen are protected and recognized. These could include disallowing offshore wind development in portions of the WEA that correspond to the highest value fishing grounds for the affected fisheries, creating buffers within the boundaries of the WEA to allow for fishing activity to safely operate around the perimeter, developing a program that helps the trawl fishery adjust to changes in fishing grounds, gear transitional programs, or developing a comprehensive mitigation package that adequately compensates fishermen for the loss of these fishing grounds, and many options in between.

It is possible, if not likely, that the ultimate solution will include elements of all these options. At this time, it is not necessary to decide exactly how all of these impacts need to be addressed. It is critical, however, that discussions about how to address impacts to specific fisheries, and to the North Coast fishing industry as a whole, include affected fishermen and representatives of the fishing industry. It is also necessary at this point in time to have BOEM, in concert with the Coastal Commission, other state and federal agencies, Tribes, and fishing interests, begin setting forth a framework for how the entire wind development process- from leasing decisions through actual wind development-will address the effects that the process will have on fishing activities. If this framework is not set up until later stages of the offshore wind development process, such as during BOEM review of a COP, it will force the fishing industry to operate for the next several years with significant uncertainty about potential future development. In addition, if BOEM waited until lessees submitted COPs to analyze and address

[18] The Fisheries of the U.S. report, page 38, states $164,327,000 of annual landings in 2019 for the state of California.

impacts to fishing, it would likely be too late to gather the necessary information about the scale and location of fishing activities as well as potential avoidance, minimization and mitigation measures that are needed to adequately evaluate and address impacts. This could significantly delay future project approvals.

In recognition of the importance of direct engagement, and in an effort to begin the discussion with fishermen about how best to address the impacts described above, representatives from State agencies, including Commission staff, and BOEM held a series of meetings with representatives of the fishing community in Crescent City, Eureka, Fort Bragg, Santa Barbara, and Morro Bay.[19] At this stage of the offshore wind process, the goal of the outreach was to meaningfully engage the fishing community about the state and federal processes for OSW development, hear their concerns, answer questions, and determine what the most appropriate avenue for addressing impacts and mitigation would be moving forward. At these meetings, there were several concerns that were echoed coastwide, that have largely been reflected in the impact analysis above. Fishermen had many questions about the scale and type of development that might take place in the coming years, concerns that the exclusions, displacement and spatial conflicts would severely limit their ability be profitable and to ensure the longevity of the industry, and an interest in an approach to mitigation that is fair, equitable, and focuses on resilience of the fisheries and of the fishing industry. These sentiments have also been reflected in follow up conversations with key representatives from the fishing community. Most of the fishermen who attended outreach meetings expressed their desire to continue fishing for years to come and to be able to pass down their knowledge and vocation to the next generation.

To achieve these goals, as well as the special protection required by the Coastal Act, all parties – fishermen, offshore wind developers and state and federal agencies – will need to work collaboratively towards a common strategy to avoid, minimize and mitigate impacts to the fishing industry in a consistent and equitable manner. As the North Coast is not the only offshore region that is being considered for offshore wind development, it is important that the overall strategy be consistent statewide to ensure fairness. BOEM has acknowledged the need for a comprehensive and fair way to address the impacts that offshore wind has on fishing interests and recently conducted a request for information and public comment period on the strategies to addressing impacts to the fishing industry from offshore wind energy development.[20]

Similar to the fishing agreements required by CDPs authorizing fiber optic cable installation and operation, the strategy will need to include communication protocols, best practices for surveys and data collection, specific measures for avoiding and minimizing impacts for various stages of offshore wind development, and a framework for compensatory mitigation to address unavoidable impacts. These goals and strategy components are consistent with verbal and written correspondence the Commission has received from fishermen from across the state. For example, a February 9, 2022 letter from sixteen (statewide) fishing and maritime organizations discusses the need for

[19] Meeting Summaries are available here: Upcoming Projects (ca.gov)
[20] Request for Information on Reducing or Avoiding Impacts of Offshore Wind Energy on Fisheries | Bureau of Ocean Energy Management (boem.gov)

fishing agreements (page 3):

> *The principals of impact avoidance, minimization, and non-monetary mitigations should be considered for all aspects of an OSW project prior to compensation-mitigation discussions. Make no mistake: fishermen would rather have their areas of opportunity preserved than have financial compensation for the loss.*

Once the strategy is developed, it will need to be applied through fishing agreements between an entity representing fishermen and the developers. These agreements will need to lay out how mitigation funds will be spent, how decisions will be made, and the process for amending the agreement as needed. It is the Commission's expectation that signed fishing agreements, consistent with the statewide strategy described above, will be completed and submitted as part of any application for a CDP or a consistency certification for an offshore wind project. To ensure progress toward development of the statewide strategy, **Condition 7** requires BOEM to work with Commission staff and other state agency staff to facilitate a working group consisting of fishing representatives, offshore wind industry representatives and federal and state agency staff to develop the components of the strategy including a fishing agreement template. **Condition 7** also requires that the strategy include specific consideration for those fisheries that are disproportionately and/or directly affected by offshore wind development. Finally, to ensure that potential impacts to commercial and recreational fishing during the lease exploration phase are minimized, **Condition 7** requires BOEM to require lessees to have an independent fisheries liaison that is responsible for coordination and communication with affected fishermen and harbor districts. The liaison will work with fishermen to coordinate timing of survey work and develop a process for reporting and remediating conflicts.

In addition to development of the strategy described above, based on a review of projects developed on the east coast, it can be assumed that at a minimum, the design of future wind farms should incorporate measures that ensure safe navigation through the lease areas, including possible identification of transit corridors. This is needed to ensure continued, safe access to fishing grounds surrounding a potential wind farm, to alleviate lengthy transit times, and to ensure that the economic interests of the fishing industry are protected so that the industry can continue to effectively harvest from the region. BOEM has conveyed that these concerns will likely be addressed through the subsequent stages of its leasing process in which the U.S. Coast Guard will be conducting a Navigational Safety Risk Assessment. This process has the goal of promoting navigational safety but is not a unilateral decision. Rather, the USCG makes recommendations based on the best available information to apply transit lanes and/or other safety measures to BOEM that the Bureau may then apply to its lessees. Commercial fishing traffic patterns are a component of this analysis and have been integrated into prior risk assessments, such as those that have been completed on the east coast (U.S. Coast Guard, 2018). **Condition 4** ensures that BOEM will work with stakeholders, including the USCG, state agencies and the fishing and maritime industries to ensure navigation through the lease areas.

### Conclusion

Leasing activities and foreseeable future offshore wind development within the Humboldt WEA will result in project-specific and cumulative adverse impacts to multiple fisheries of economic and social importance to the state of California. Fisheries and fishing communities are likely to be directly impacted by lease exploration activities, including by having increased vessel traffic in the Humboldt Harbor District, exclusion areas around metocean buoys, and the economic uncertainties caused by BOEM's leasing process. In addition, the exact scale and location of future wind development is unknown at this time, but it is reasonably foreseeable that there will be future development of at least some OSW projects. Such projects would affect fishing directly due to the presence of wind turbines and related infrastructure (exclusion and displacement) as well as indirectly through increased vessel traffic, Humboldt Harbor District development and decreases in trip efficiency. Although some of these activities will occur outside of the coastal zone, much of the development activity—such as Humboldt Harbor District development and use, as well as cable-laying—will occur within the coastal zone. Also, both the activities in and outside of the coastal zone will have coastal effects, as they will both affect the coastal fishing community, the volume and value of fish landed at ports and harbors, and the coastal economy. As such, it is imperative that BOEM, lessees and developers work with the fishing community to minimize these effects in the planning and development of potential projects to ensure that the seafood industry in the North Coast remains viable and robust. To achieve this, **Condition 7** requires that BOEM require lessees to have an independent fisheries liaison to coordinate with fishermen and that BOEM work with state agencies to facilitate a process to develop a statewide strategy for avoiding, minimizing and mitigating impacts to the fishing industry from offshore wind development. With the measures incorporated by BOEM into its leasing program and the conditions imposed by the Commission, BOEM's proposed activities are consistent with the Coastal Act's mandate to protect commercial and recreational fishing.

## G. Oil Spills

Section 30232 of the Coastal Act states:

> *Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.*

### Lease Exploration

The issuance of leases and subsequent site assessment and characterization activities have the potential to result in oil spills within or outside of the coastal zone, either of which could affect coastal resources. According to the consistency determination, a spill of petroleum product could occur as the result of hull damage from collisions with a metocean 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). As described in previous sections of these findings, vessel traffic is expected

to approximately triple as a result of lease exploration activities, increasing the risk of an oil spill incident.

The consistency determination provides general information on potential impacts from an oil spill, concluding that an oil spill would dissipate very rapidly and would then evaporate and biodegrade within a day or two, limiting the potential impacts to a localized area for a short duration. Regarding the potential for a diesel spill to enter ocean waters and affect coastal resources, the consistency determination states:

> *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 reasonably foreseeable site assessment and site characterization activities. 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, suggesting that 88 gallons would reach similar concentrations much faster and limit the environmental impact of such a spill (Tetra Tech Inc., 2015).*

The first test of Coastal Act Section 30232 requires evidence of oil spill prevention technologies, programs, and procedures to "protect against the spillage of crude oil, gas, petroleum products, or hazardous substances..." According to the consistency determination:

> *Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills, and most equipment on the metocean buoys would mostly likely 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.*

The Commission's oil spill program coordinator reviewed the above referenced USCG regulations and determined that many of them do not appear applicable to the types of vessels expected to undertake site assessment and characterization activities. For example, 33 CFR Part 151 includes requirements for shipboard oil pollution emergency plans, but those requirements appear to only apply to oil tankers and other ships 400 gross tons or above (see 33 CFR §§ 151.09(c), 151.26 - 151.28). 33 CFR Part 154

deals specifically with facilities transferring oil or hazardous materials in bulk and does not appear to apply to the project. The implementation of vessel response plans called for in 33 CFR Part 155 apply to tank and non-tank vessels 400 gross tons or above and would also not appear to apply to the types of vessels undertaking site assessment and characterization activities (see 33 CFR § 155.5015(a)(4)). It should be noted that much of the information and standards required under the cited USCG regulations are important and do help meet the Commission's requirements for spill prevention and safety measures. For example, 33 CFR Part 151 generally prohibits the intentional discharge of oil or oily mixtures into the sea. However, some of the requirements, such as for spill prevention measures, do not appear applicable to this project and are therefore inadequate to assure compliance with the first test of Section 30232.

The second test of Section 30232 requires that effective containment and cleanup facilities and procedures be provided for accidental spills that do occur. To meet this test the Commission typically requires submittal of a project-specific Spill Prevention and Response Plan (SPRP) that demonstrates adequate oil spill response equipment, trained personnel, and waste disposal capability to contain and clean up the volume calculated for the worst-case spill.

To ensure that effective oil spill prevention and response measures are in place for the expected site assessment and characterization activities, **Condition 1(f)(ii)** requires BOEM to require the lessee to submit a site-specific SPRP a minimum of 30 days before the commencement of any in-water survey activities or as part of any survey or SAP. The primary focus of the SPRP condition is on increasing the scope and level of detail regarding response efforts that would be taken in the event of a worst-case oil spill. The SPRP must include a description of preventative measures and programs the lessee will implement to avoid spills, including pollution prevention best practices that are proposed to be implemented during lease exploration activities. The SPRP must also identify the worst-case spill scenario, the response strategies that would be employed, and demonstrate that adequate containment and cleanup equipment will be available in the event of a worst-case spill. Appropriate spill notification procedures, including an up-to-date list of contacts to call in the event of a worst-case spill, as well as information demonstrating training of personnel on the components of the plan will be required. Contracts with off-site spill response companies should be in-place to provide additional containment and clean-up resources as needed. In addition to a site-specific oil spill plan, **Condition 1(f)(iii)** requires BOEM to require lessees to include a Critical Operations and Curtailment Plan (COCP) as part of any survey SAP. This plan describes limiting conditions of sea state, wind, or any other weather conditions that would hinder safe operation of vessels and equipment or a potential spill cleanup.

**Lease Development**

Oil spill risks during lease development are expected to be similar to the risks outlined above during lease exploration activities. However, the risks will likely be greater, as there will be an increased number of larger vessels on the water for longer periods of time. Additionally, offshore wind turbines require oil-based lubricants and other

chemicals, such as coolants, to function. Accidental spills of these chemicals may occur during regular maintenance, or due to foreseeable but unlikely events, such as a major storm that damages the turbines. Similar to the requirements described above for lease exploration activities, the Commission expects lessees to submit a project-specific SPRP and COCP covering construction and operations of any proposed development as part of a consistency certification.

As conditioned, the Commission concludes that the project is consistent with Coastal Act Section 30232.

## H. COASTAL HAZARDS

Section 30253 states, in relevant part:

> *New development shall do all of the following: (a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard. (b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area …*

The Commission's review of coastal hazards in this case focuses on spillover effects of lease exploration and lease development to ensure that they minimize the risk to life and property. The potential coastal hazards associated with lease exploration are likely to be minimal and limited to foreseeable non-routine and low-probability events. Future lease development qualifies as new development under section 30253 and the Commission expects that lessees' development proposals will be designed and engineered to assure structural stability and integrity in extreme ocean conditions.

### Lease Exploration

Lease exploration activities include an intensification of the use of vessels on the water and the potential deployment of a few buoys, both of which constitute new development. Although neither the absolute number of new vessels or buoys will be particularly large, reasonably foreseeable non-routine and low-probability events and hazards could occur during lease exploration, including collisions between the site assessment structures or associated vessels and other marine vessels, spills from collisions or fuel spills resulting from generator refueling, and recovery of lost survey equipment. These collisions may result in spills of vessel fuel and refueling of generators on metocean buoys may also result in accidental spills. Oil spill impacts are discussed section G of this report and will not be discussed further here.

<u>Collisions</u>

Lease exploration activities have the potential to significantly increase the non-fishing related vessel traffic in the Humboldt WEA. As discussed in section E, non-fishing vessel traffic is expected to approximately triple during lease exploration activities. Currently, the dominant activity in this region is commercial fishing. When actively engaged in fishing activities, vessels are less able to maneuver due to the presence of gear in the water and the acts of harvesting catch and bringing it safely aboard. Survey vessels with gear deployed (e.g., core sampling, pulling of gear through the water, ROV

deployment) will also be restricted in their ability to maneuver. Although unlikely, it is possible that there may be vessel collisions during lease exploration activities. Thus, it will be critical to ensure that the fishing industry and lessees' contractors are regularly communicating so as to avoid impacts. Under **Condition 7** BOEM will require lessees to fund an independent fisheries liaison that is responsible for the coordination and communication of site activities with the affected commercial and recreational fishing communities and harbor districts. Communication about surveying activities and engagement will enable lessees to time their surveys to avoid high-fishing times, such as season openings, and will help prevent accidents.

The Humboldt Harbor District experiences minimal shipping and commerce traffic in comparison to larger ports such as San Francisco or Los Angeles, which means that commercial shipping traffic is more widely dispersed and generally farther offshore than the WEA. To ensure that mariners are notified of lease exploration activities, under **Condition 7**, the fisheries liaison referenced above will also be responsible for providing local notices to mariners to ensure that non-fishing vessel traffic is also aware of lease exploration activities. Finally, **Condition 3** ensures BOEM will require its lessees to limit transit speeds to 10 knots or less during lease characterization studies, surveys, and metocean buoy installation, maintenance or decommissioning activities, which will also help to reduce the likelihood of collisions.

Lost Survey Equipment

In its EA, BOEM identifies the foreseeable but unlikely event that equipment could be lost during lease exploration activities. This equipment may include towed HRG survey equipment, cone penetration test components, grab samplers, buoys, lines and cables. It's also possible that a metocean buoy would disconnect from the clump anchor. If equipment is lost, recovery operations may be undertaken using ROVs and grapnel lines, depending on water depth and equipment lost. Where lost survey equipment is not able to be retrieved because it is completely or partially embedded in the seafloor, the lost equipment may become a hazard for bottom tending fishing gear. In these cases, lost equipment may be cut off 3-6.5 feet below the seafloor. BOEM has committed to working with the lessee to develop an emergency response plan addressing lost equipment and recovery.

Taken together, all of the measures described above will adequately reduce the risk of harm to life and property, consistent with Section 30253.

**Lease Development**

Lease development will involve the installation of floating offshore wind turbines in the Humboldt WEA. In addition to the hazards described above, the main hazard associated with installing and operating turbines is emergency preparedness and the potential that turbines could be damaged or break free from moorings during normal or storm-related conditions on the ocean. In addition to storms, environmental hazards within the Humboldt WEA such as earthquakes, tsunamis pose additional risks of damage to or from offshore wind turbines. Finally, the development of offshore wind infrastructure creates navigational hazards for other ocean users.

Storms and Emergency Preparedness

Extreme ocean conditions and storms have the potential to damage offshore wind turbines, moorings and electrical equipment. The average wave height in the Humboldt WEA is 6-8 feet. The high winds and waves that occur during storms have the potential to put enormous stress on offshore wind turbines and infrastructure. In extreme cases, this may result in an offshore wind turbine breaking away from its moorings or anchors and creating a hazard on the ocean's surface or sinking into the ocean, and potentially damaging seafloor habitat, as discussed in section E of these findings. In less extreme cases, this may result in portions of the offshore wind turbine (such as one of the blades) coming off the main structure and sinking. To address these concerns, lessees will need to demonstrate that the proposed project components can withstand normal and expected extreme ocean conditions associated with offshore storms. Additionally, each lessee will be expected to include a hazard mitigation plan as part of its COP describing how its facilities will be safely operated and maintained during normal and extreme storm-related conditions and then what steps the operator will take to remove any hazardous equipment if necessary. Finally, BOEM requires its lessees to provide a bond prior to lease issuance to guarantee compliance with all terms and conditions of the lease. As described in 30 CFR Section 585.516, BOEM then requires a series of financial assurances or bonds when SAPs and COPs are approved and equipment is installed in the lease area. Together these bonds provide financial assurances that funds are available to locate and remove orphaned or damaged infrastructure during each phase of the development process, should a lessee be unable to meet its obligations for maintenance or removal of equipment. Furthermore, the Commission expects that each COP submittal will include a Hazards Mitigation Plan that describes how the facility is designed to withstand hazards but also describes communication and recovery protocols in the event of a system or facility failure.

As mentioned in section F of these findings, development of the Humboldt WEA has the potential to impact navigation by excluding vessels from the area. As storms or dangerous sea states begin, there may be a need for fishing vessels or other vessels to get back to the Humboldt Harbor District quickly. The WEA's location directly off of the mouth of Humboldt Bay may cause longer transit times if mariners are forced to transit around the wind facility and thus increase the difficulty associated with getting out of dangerous conditions. To address the need for transit through the Humboldt WEA, under **Condition 4**, BOEM, in collaboration with the US Coast Guard, appropriate state and federal agencies, and stakeholders, will undertake a process to determine how to ensure safe navigation through the lease areas. This may include designation of transit corridors through the lease areas.

Earthquake Risk

The Humboldt WEA is located near the Cascadia subduction zone. The Cascadia subduction zone is located 70 to 100 miles off the coast. This area is where the Juan de Fuca plate is moving beneath the North American plate and has the potential to create the largest earthquakes in the United States. The last megathrust earthquake at the Cascadia subduction zone occurred around 1700 and has been estimated to have a magnitude of 8.7 to 9.2 (Pacific Northwest Seismic Network, 2022). Although turbines themselves will be floating and should not be directly affected by earth movement, any

anchoring systems, mooring lines and other fixed development in the Humboldt WEA should be engineered to withstand significant seafloor shaking. There are smaller faults within and in the immediate vicinity of the Humboldt WEA. The Commission expects that individual turbine anchors and turbine arrays will be sited to avoid faults within the WEA and will incorporate a sufficient buffer to minimize impacts from a seismic event. A map of the faults in and around the Humboldt WEA is available in **Exhibit 4-1**. Shore-side infrastructure relating to offshore wind development, including Humboldt Harbor District facilities and potentially onshore connection points for electric transmission, would likely be at risk for damage during an earthquake. The Commission expects that development proposals for transmission and Humboldt Harbor District development would be designed and built using adequate siting and design standards to minimize or avoid risk of damage from earthquakes. The hazard mitigation plan described above should also incorporate seismic risks and conditions.

Tsunami Risk

Forty-one tsunamis have been recorded on the Northern California Coast since 1933 (Redwood Coast Tsunami Workgroup, 2022). Tsunamis are caused by earthquakes or other geologic activity, such as landslides, that displace large volumes of water. The location of the Humboldt WEA in deep offshore waters makes it resilient to impacts from tsunamis. Tsunamis only become hazardous when they approach land; in deep water at sea, the top of the wave rarely reaches more than three feet higher than the ocean swell (*Tsunamis*, 2018). The mooring and anchoring systems of offshore wind turbines are expected to withstand substantial variability in extreme offshore conditions, including tsunamis. Shore-side infrastructure relating to offshore wind development, including Humboldt Harbor District facilities and potentially onshore connection points for electric transmission, would likely be at risk for damage during a tsunami. The Commission expects that development proposals for transmission and Humboldt Harbor District development would be sited outside of tsunami flood zones, to the extent feasible, and designed to withstand or minimize risk from tsunami flooding if within a flood zone. The hazard mitigation plan described above should also incorporate tsunami risk and conditions. A map of tsunami risk areas in Humboldt Bay is available in **Exhibit 4-2**.

Navigational Hazards

The installation of offshore wind turbines, floating inter-array cables, anchors, and mooring lines may create navigational hazards to vessels fishing or transiting through the Humboldt WEA. Depending on vessel draft, inter-array cables could catch on vessels, and the presence of floating equipment may result in collisions if vessels are unaware of the offshore wind development. The Coastal Commission expects that future wind development will include geo-locating equipment on the turbines, and for wind facilities to be included in aids to navigation to ensure that vessels know the location of the wind development to avoid navigational hazards. Furthermore, lessees will need to demonstrate that future wind turbine spacing will be sufficient for the Coast Guard to conduct search and rescue operations in the WEA, in the event of an emergency.

Lease exploration activities may increase collision and collision hazards and hazards associated with lost survey equipment.  With implementation of BOEM's protective

measures and **Conditions 3, 4, and 7**, the proposed development activity will minimize risks to life and property and is therefore consistent with Section 30253 of the Coastal Act. Installation of wind turbines at a future time will create new structures that will need to be structurally stable in stormy ocean conditions. Offshore floating wind turbines have only been deployed in a few locations in the world at this point, and designs and technologies are still being developed. Future proposals for specific projects will need to be analyzed to ensure safety and stability.

## I. SCENIC AND VISUAL RESOURCES

Coastal Act Section 30251 states:

> *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.*

The Commission's review of activities in federal waters is focused solely on analysis of spillover effects on coastal resources within the Coastal Zone, such as how development activity would affect views from the coast over the ocean. The proposed project is located approximately 21 miles offshore, west of the Coastal Zone. Views are a critical component of public access and enjoyment of the coast. Current views of the ocean off the Humboldt coast include natural features, such as offshore rocks, water, and wildlife and do not include substantial infrastructure or development. Pursuant to Section 30251, new development, such as eventual lease development, should protect visual qualities along the ocean and scenic coastal areas and should be visually compatible with the character of surrounding areas. Coastal Act and LCP policies generally focus on protecting views along the coastline. For example, the Trinidad LCP requires development to not block the view of the coast or waterways from public roads. The McKinleyville Area LCP designates the vistas from Highway 101 along Clam Beach as a coastal scenic area. The Coastal Act calls out areas identified in the California Coastline Preservation and Recreation Plan for visual protection. In the Humboldt region, most of the coastline is available for access and recreation through public beaches and parks. For a map of public coastal access points, please see **Exhibit 6-2**. Due to this project's offshore location, the lease exploration and lease development activities would not obstruct views of the coastline from inland locations. However, both lease exploration and lease development will change scenic vistas of the ocean itself from shore

### Visual Effects of Lease Exploration

Lease exploration would occur at least 21 miles offshore, and the activities undertaken

to conduct the site assessment and studies would have little potential to affect scenic vistas from highly scenic areas or coastal scenic areas. Survey activities are expected to increase vessel traffic in the WEA, but the vessel traffic associated with survey activities would be indistinguishable from other vessel traffic in the area and would cause minimal changes to scenic vistas. Site assessment and studies could result in the placement of spar buoys equipped with light detection and ranging (LiDAR). The buoys would be expected to be installed by roughly 80-foot vessels, and once installed, approximately 40 feet of the buoy would be visible above the water line, which would create very minimal changes to scenic vistas on the coast. Buoy lighting would be indistinguishable from lighting associated with vessel traffic. There would be a maximum of three buoys being deployed at once for up to five years anticipated by BOEM. These would cause minimal effects, and lease exploration activities are consistent with the requirement to protect scenic views and visual qualities.

### Visual Effects of Lease Development

Lease development would include the installation of offshore wind turbines on the lease area. The specific locations of each turbine and the area of the Humboldt WEA to be developed are currently unknown. However, a hypothetical project can be used to understand general future impacts of lease development. BOEM performed visual simulations for the Humboldt WEA using a hypothetical project. The visual simulations and related meteorological report are available in **Exhibit 5-1** and **Appendix A**, respectively (BOEM and ESS Group, Inc., 2019). These simulations assumed a 1,000 MW project using 15 MW turbines. This hypothetical project was selected to represent a commercially scaled and technically feasible project that would eventually be developed in the Humboldt WEA. The visual simulation modeled 67 turbines; each turbine has a hub height of 486 feet, a rotor diameter of 807 feet, and a maximum height at the blade tip of 889 feet. Nighttime simulations were based on the Federal Aviation Administration's guidance, which specifies two red lights per turbine nacelle and three lights mounted at a midpoint on each turbine's tower. Simulations of the Humboldt call area were modeled with a view from Sue-Meg State Park (formerly called Patrick's Point State Park) at 157 feet above sea level. At the Sue-Meg State Park viewpoint, the turbines would be visible near the horizon line in the daytime, even in cloudy conditions. Cloudy conditions reduce the visibility from shore and enable the turbines to blend in with the white or light gray colors of the sky; clear conditions would make the turbines more visible. Although they are visible, the turbines do not dominate the views offshore due to their distance from shore. At night, the lighting on the turbines is also visible. All images produced as part of the visual simulation are available in **Exhibit 5-1**.

Since scenic vistas of the ocean in the Humboldt area are currently free from visible offshore development, lease development would affect visual and scenic resources off the Humboldt coast. The turbines are not expected to be visible all the time from all viewpoints. The turbines would be more visible at ocean viewpoints with higher elevations. At sea level, because average daytime visibility on the Humboldt coast is 8 nm, with the turbines being at least 20 nm from shore, they often would not be visible from the beach. Visibility to 20 nm would be expected to occur 58 days annually, and visibility to 30 nm would be expected to occur 23 days annually. At higher elevations, the average number of days the turbines would be visible would be greater, although it

is not clear by how much. The average nighttime visibility at sea level is 11 nm from shore, however, with lighting the turbines would be visible at night. Additional details of how meteorological conditions affect visibility from shore are available in the meteorological report in **Appendix A**.

Completely eliminating the effects of lease development on scenic and visual resources is infeasible, because visual impacts change due to weather, elevation of specific viewpoints, and the specific proposals included in future projects. However, visual impacts may be minimized through micrositing (e.g. moving specific turbines), and factoring visual impacts into design choices, such as paint color. Even with these measures, there is still a likely potential for some visual impacts, and there may be a need for other visual mitigation.

To ensure effective impacts assessment during the COP phase, BOEM plans to require that lessees prepare a set of project-specific visual simulations from highly scenic viewpoints as part of their COP submission. Lessees should consult with Commission staff on the selection of viewpoints, to ensure a good representation of potential visual effects from a specific project. Lessees are also encouraged to consult with local Tribes and well as local communities to select viewpoints and to discuss potential minimization and mitigation measures. Additionally, under **Condition 1**, BOEM will work with Coastal Commission staff to ensure that lessees' SAPs and survey plans are coordinated, consistent and provide the data necessary for analysis of future consistency certifications. This condition will ensure that Coastal Commission staff receive the information necessary to fully assess impacts to scenic and visual resources at the COP phase. Lease exploration activities will not have visual impacts that are inconsistent with Section 30251. Future lease development activity will have visual impacts on scenic views of the ocean from the shore, but the extent of impacts will not be known until specific proposals are developed. **Condition 1** will help ensure that such impacts can be assessed and addressed at the next phase.

### J. PUBLIC ACCESS AND RECREATION

Coastal Act Section 30210 states:

> *In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.*

Coastal Act Section 30220 states:

> *Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.*

Coastal Act Section 30224 states:

> *Increased recreational boating use of coastal waters shall be encouraged,*

> *in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.*

Public access to the coast and coastal waters for recreation is a key component of the Coastal Act. Due to the Humboldt WEA's location approximately 20 miles from shore, the recreational activities taking place in or beyond the Humboldt WEA are limited. Some examples of recreational activities in or near the Humboldt WEA include Albacore fishing or other sportfishing, and recreational boating. Impacts of lease exploration and lease development to offshore recreational fishing is covered in section F of these findings and will not be discussed further here. Humboldt Bay has a system of designated water trails for non-motorized recreational boating, and many boat ramps, marinas and other opportunities for the public to access water oriented recreational activities. A map of these trails and facilities may be found in **Exhibit 6-1**. Five public parks and beaches are on the north and south spits of Humboldt Bay, allowing for public access and recreation on the coast; a map of coastal access points, the coastal trail, and public parks is available in **Exhibit 6-2**.

### Lease Exploration

Lease exploration activities have the potential to minimally impact public access and recreation. Although the number of vessel trips in the Humboldt WEA will increase to perform surveys and research, the total number of vessels expected to be used for this work is low. Additionally, survey and research activity will not preclude recreational boating activities in the Humboldt WEA or surrounding areas. As discussed in the scenic and visual resources section, lease exploration activities are visually indistinguishable from other vessel traffic and buoys in the area and would not change the visual character of beach recreation experiences.

### Lease Development

Lease development has the potential to impact recreational boating both in the ocean and in Humboldt Bay. Offshore wind turbines may change the recreational value of boating in the vicinity of the Humboldt WEA, leading boaters to go elsewhere. However, likely due to the WEA's distance from shore and Humboldt Bay, there may not be a lot of recreational boating happening in the Humboldt WEA, and effects on recreational boating are expected to be minor. Furthermore, it is possible that development of a large scale floating offshore wind facility could attract public interest and create a new recreational boating destination. Regardless, **Condition 4**, which requires BOEM to engage with the state, US Coast Guard, fishing community, and other entities to ensure safe navigation through the lease areas, will assist recreational boaters with safe passage through the WEA.

Lease development has the potential to lead to port facilities development in Humboldt Bay, which would impact water-oriented recreation within the Bay. The Humboldt

Harbor District is interested in redeveloping Redwood Marine Terminal 1 for offshore wind turbine manufacturing, assembly, and maintenance. Any proposed redevelopment by the Humboldt Harbor District would come before the Commission, or local government with a certified Local Coastal Program as a separate CDP. However, it is discussed here to provide a full discussion of potential impacts from future offshore wind development in the WEA.

Redevelopment of this marine terminal has the potential to impact the quantity and type of vessel traffic moving through the bay and may impact recreational uses within Humboldt Bay, including non-motorized recreational boating (e.g., kayaking) and recreational fishing within Humboldt Bay. Redwood Marine Terminal 1 is located adjacent to the low tide water trail in Samoa, and if this site is used for offshore wind-related purposes, it is foreseeable that large, motorized vessel traffic in the vicinity of the water trail would increase, and operations to tow assembled turbines to and from the WEA may make the area less suitable for recreation. In an email to the Commission, received on March 9, 2022, Humboldt Baykeeper, a local environmental nonprofit indicated that the dock at the current Redwood Marine Terminal 1 site is used for recreational fishing, and redevelopment of the site may make it unsuitable for this use. Humboldt Baykeeper recommended that future development proposals consider the need for a new public fishing pier to maintain access to recreational fishing in Humboldt Bay.

Lease development will also increase the need for maintenance vessels and workers in the vicinity of Humboldt Bay. The increase in vessels and workers may create indirect effects on recreational opportunities, such as creating increased competition for boat slips or increased competition for parking at beach access points across from the Redwood Marine Terminal property. Humboldt Baykeeper recommended that future development in Humboldt Bay also consider enhancing public access through developing trails from residential areas to the waterfront, creating a new waterfront park, and ensuring safe bike and pedestrian connections along the Samoa peninsula. Although much needs to be determined before redevelopment of Redwood Marine Terminal 1 occurs, any future Humboldt Harbor District development will need to demonstrate that coastal access continues to be maximized and ensure that water oriented recreational activities will be able to safely continue in Humboldt Bay.

## K. Tribal and Cultural Resources

Coastal Act Section 30244 states:

> *Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.*

Coastal Act Section 30244 states that reasonable mitigation measures shall be required where development would adversely impact archaeological resources. Other Coastal Act provisions protect marine and biological resources, scenic views, habitat areas, and other resources that may be considered sacred or important to Tribes and that may constitute tribal cultural resources. Overall, protected resources may include sacred lands, traditional cultural places and resources, archaeological sites, and submerged

historical resources such as shipwrecks. As described in the Commission's Tribal Consultation Policy, adopted on August 8, 2018, tribal cultural resources are not confined to the boundaries of archaeological sites, but instead can encompass landscapes that are significant to Native American tribal groups because of habitation or use for cultural practices. As described in section D of this report, BOEM has invited Tribes to participate in California Offshore Wind Task Force, and the CEC has led the effort to engage with both federally-recognized and non-federally recognized Tribes in planning for offshore wind. As described in section D, Commission staff initiated formal tribal consultation with Tribes, consistent with the Commission's 2018 Tribal Consultation Policy. The findings below summarize the cultural history of the Humboldt area, submerged historical and archaeological resources and outcomes of the Commission's tribal consultation. Offshore wind lease exploration and lease development has the potential to affect both Native American cultural practices and specific archaeological sites. BOEM's requirements for lessees as part of the EA are reasonable mitigation measures and will minimize lease exploration effects on submerged cultural resources. However potential impacts to submerged historical and archeological sites are more likely in later phases of lease development when specific export cable routes, cable landings, Humboldt Harbor District development, and transmission are being considered.

**Cultural History of the Humboldt Area**

Native peoples have occupied the north coast area for at least 2,500 years, but many Native American Tribes ascertain occupations since "time immemorial" (Moratto, 1984: 485). Attempting to establish dates between 2,500 years ago and time immemorial based on specific archaeological evidence is difficult. There is a distinct possibility of earlier archaeological evidence existing in submerged lands under the ocean and offshore Humboldt County from earlier land occupations or from ocean migratory routes that followed more archaic coastlines as early as 15,000 years ago (Moratto, 1984: 34). However, there has been emerging evidence that suggests the peopling of North America occurred well before 15,000 years ago and as early as 25,000 years ago (Lenberg, 2021). Native American cultures thrived along the North Coast and prior to subsequent Spanish maritime and coastal exploration, American settlement, and the more recent influx and diversity of Coastal Northern California cultures.

Several distinct tribal cultures remain predominant in the North Coast area: Tolowa, Yurok, Wiyot, Mattole and the more inland Hupa and Karuk. However, it is the Yurok and Wiyot Tribes that are most immediately affiliated with the coastline and ocean whose cultures may incur impacts from offshore wind development. The Yurok historically inhabited the coastline from Little River north, including a set of three coastal lagoons, and the Klamath river for some distance upriver and beyond the coastline. The Wiyot historically inhabited the coastline from Little River south, including the Humboldt Bay region and the Eel and Mad Rivers for some distance upriver and beyond the coastline. Therefore, Wiyot and Yurok are peoples of the ocean, shoreline, bays and lagoons and rivers, and their respective cultures reflect a rich heritage of knowledge and utilization of the resources that such ecosystems provide.

Yurok and Wiyot peoples inhabiting the coastal environments relied on the ocean,

shorelines, bays, lagoons and riverine estuary resources for daily subsistence. Plants, animals, fish, and minerals gathered, hunted or collected, in addition to food sources, were also used to fashion the tools, shelter, clothing, regalia and trade items (Elsasser, 1978: 155-163; Kroeber, 1976: 76-97, 112-120; Pilling, 1978: 137-154). Both the Wiyot and the Yurok fashioned several types of boats, including the Yurok ocean-going canoe. Sea lions were hunted on offshore rocks, including at locations miles distant from the shoreline (Hildebrandt, 1981). Various fish were harvested from the various water bodies, including several species of salmonids, sturgeon, candlefish or eulachon, surf fish and eels. The littoral zone provided shellfish, seaweed, firewood, and other plant and animal resources. Shells were gathered along the beach and used in the making of regalia, with the dentalium shell used as currency.

Early European maritime exploration occurred along the north coast, most notoriously when Bruno de Hezeta sailed into Trinidad Bay in 1775 to take on provisions, interact with the Yurok of the village of Tsurai, and claim the land for the King and Queen of Spain (Heizer and Mills, 1991). Later maritime exploration by the Spanish and more intensely by American explorers, traders, and settlers ensued. Just prior to and immediately after the transfer of California from the Mexican government to the American government the north coast was explored first by the Jedidiah Smith expedition of 1828 and the Josiah Gregg expedition of 1846. Both parties were intent on locating Humboldt Bay to ascertain where it might be most practical to establish a port from which to gain a foothold on North Coast settlement. The Smith party missed the bay and instead had interactions with the Yurok in the Bald Hills above the current coastal town of Orick, and from there traveled north along the Klamath and onwards into Oregon (Dale, 1941). A decade after the Smith expedition, Josiah Gregg and his party, after naming the Mad River for a dispute among his party, did locate Humboldt Bay, but with dissension within his ranks, never fully explored the body of water. The party split-up along the Eel River near Fortuna, and both sub-parties met with ill fate and few survivors (Hoopes, 1971). Some of those survivors immediately returned and established their own land claims near Trinidad Bay.

With the discovery of gold along the Trinity River, Trinidad and Bucksport (Southern Eureka) became ports of entry leading to non-indigenous population growth (Coy, 1929). The establishment of port towns led to the development of trade and transportation, and the opening of several industries, namely related to fishing and timber extractions (Coy, 1929). Maritime and overland routes to the north coast were developed. Shipwrecks, some near the mouth of Humboldt Bay occurred, and lighthouses were established to guide the ships to the ports while avoiding more treacherous coastline features. Some of the early North Coast lighthouses include Point Mendocino (1868), Table Bluff (1892), Humboldt Harbor (1856), Trinidad Head (1866) and Battery Point (1852) (*Itinerary: Lighthouses of California's North Coast*, 2019). The influx of settlers, miners and entrepreneurs lead to conflict with the Wiyot, Yurok, and other inland Tribes. Militias were formed and genocide of Tribes ensued (Lindsay, 2012: 326-331). The military was brought in to "keep the peace." Several military forts and outposts were constructed, including Fort Humboldt near Bucksport, Fort Gaston in Hoopa, and Fort Ter-Waw near Klamath. As a result of foreign disease, murder, and encroachment, the indigenous peoples and their ways of life were drastically diminished and resultant destruction and takings of the North Coast natural environment occurred.

Currently the Yurok people are represented by four Tribes. From the north, the Yurok Tribe is located on a reservation that follows the Klamath River from its mouth inland for some 44 miles. The Resighini Rancheria is a small Yurok Tribe located inside the boundaries of the larger Yurok Tribe. The Big Lagoon Rancheria is located on a small reservation on the southern shores of Big Lagoon. The Cher-Ae Heights Indian Community of the Trinidad Rancheria is located along the coast at Trinidad Bay.

Currently the Wiyot people are represented by three Tribes. The Wiyot Tribe is located on the ocean headlands that separate Humboldt Bay and the Eel River estuary. The Bear River Tribe of the Rohnerville Rancheria is located inland from the Wiyot and on the north side of the Eel River in the hills above the town of Fortuna. The Bear River Tribe also represents the Mattole people of the Bear River, a comparatively smaller watershed located immediately south of the Eel River. The Blue Lake Rancheria is located to the north of the other two Wiyot Tribes, and is adjacent to the City of Blue Lake located along the Mad River approximately 5 miles inland from the Coast. See **Exhibit 7-1** for a tribal map near the WEA.

### Submerged Cultural Resources and Shipwrecks

Due to historic changes in sea level, lands under the current ocean waters were previously exposed. Mapping shows where such paleo-lands were exposed within the timeframes for which the north coast was occupied by Native Americans. While it is unlikely that submerged lands under the Humboldt WEA were exposed during times when the coast was first occupied, certainly submerged lands eastward of the WEA perhaps up to 19,700 years ago, including all lands under state waters, were exposed during earlier occupations (ICF International et al., 2013). Comparing current onshore archaeological and ethnographic resource locations and related geography with offshore bathymetry in previously exposed and likely occupied lands, provides predictions for where submerged cultural resources may be located. A map of these resources is available in **Exhibit 7-2**.

Historic shipwrecks are also found along the Humboldt coastline. BOEM has identified 72 known and reported historic shipwrecks within the vicinity of the Humboldt WEA, with most of shipwreck locations east of the WEA and closer to shore. The Humboldt WEA has not been extensively surveyed for shipwrecks or other submerged cultural resources and therefore BOEM is requiring the results of historic property identification surveys to be submitted with a SAP and a COP.

### Ongoing State Studies: Cultural Resources Inventory

In preparing for potential offshore wind energy development and related environmental reviews, the CEC has compiled the North Coast Offshore Wind Cultural Inventory. The inventory is located on a geographic information system (GIS) platform and is meant to provide state and federal agencies and the seven North-coast affiliated Tribes described above, with access to cultural resources data per data sharing agreements for use in evaluating offshore wind energy development and potential related cultural resources impacts. These data will be important in informing future development and review of offshore wind projects. The inventory is still in progress and is undergoing review by cultural resources staff of the Wiyot and Yurok Tribes.

As a result of this inventory effort 566 cultural resource records and 358 ethnographic resources have been mapped. In addition, initial ethnographic literature research revealed 55 animals and 25 plants of cultural value for the Yurok; and 44 animals and 25 plants of cultural value for the Wiyot (Curtis, 1924; Kroeber, 1949; Loud, 1918; Waterman, 1920). The CEC is preparing tables of culturally important plants and animals to the Yurok and Wiyot. These tables are not yet complete and have not gone through a full review from the Tribes. Once these tables and the inventory are complete, they will provide a valuable resource, in addition to tribal consultation, for understanding the impacts of offshore wind on Tribes and culturally important species.

As mentioned above, this information gathering process is still in-progress and is not finalized. The final approved inventory will be a valuable resource in addition to tribal consultation to understand the impacts of future offshore wind development projects.

**Coastal Commission Tribal Consultation**

As mentioned above, the process of early tribal engagement and consultation was described in section D of this report. The following information focuses specifically on the Coastal Commission's government to government consultations and the outcomes of those consultations. During the CD review process, Coastal Commission staff reached out to numerous tribal representatives for the purpose of consultation and coordination on the proposed CD. After initially contacting tribal members through email, staff held three consultation meetings via zoom with representatives of the Blue Lake Rancheria, the Wiyot Tribe, and the Yurok Tribe in November of 2021. Staff offered follow up consultation meetings with each Tribe in early 2022 and held additional consultation meetings with Blue Lake Rancheria, the Wiyot Tribe and the Yurok Tribe in early March 2022. Each Tribe had the opportunity to review and revise the section below describing the Tribe's consultation with Commission staff for accuracy and completeness.

<u>Blue Lake Rancheria Consultation</u>

During staff discussions with the Blue Lake Rancheria (Tribe), tribal representatives indicated that the Tribe is deeply concerned about the effects of climate change on the environment and requested a comprehensive consideration of climate change impacts, as it relates to the need for upcoming and future offshore wind projects. Tribal representatives indicated the need to switch to carbon-free energy sources to protect the birds, fish, and other wildlife from climate change. Tribal representatives also expressed concerns about setting appropriate requirements applicable to a large-scale, long term international offshore wind industry coming to relatively under-resourced rural communities and emphasized the need to ensure that local communities benefit from these projects in real terms such as local energy resilience. Blue Lake Rancheria representatives specifically called out the provision of clean energy as one of these benefits. Additionally, there is a need to ensure that the Tribe is engaged in the long-term with decision-making for future projects, project monitoring, and impact assessment.

The Blue Lake Rancheria is concerned that the appropriate amount of funding and resources are built into the permitting and leasing stipulations to ensure appropriate

monitoring, permit/lease compliance reviews, and any remedial or enforcement activities are paid for, and bad actor events do not become a burden on this rural, under-resourced region. The Tribe described the need for a community-based technical working group that would be funded by the lessees to fulfill the community portions of these monitoring, compliance, and adaptive management activities, and pointed to the SONGS model and the Tribal leadership of Marine Protection Act (MPA) monitoring sites as examples to work from. Tribal representation in the technical working group will meet Environmental Justice objectives. The Tribe described the technical working group as long-term, with the need for funding for offshore wind projects' pre-development and operational phases and could be a community-engagement clearinghouse for additional data collection, research, surveys, data gap identification, and adaptive management over a 50-100 year period. It is important that BOEM recognize the successful bidders and lessees will be responsible for funding these objectives and needs. The Tribe expressed the need for greater transparency and education regarding BOEM's processes for compliance monitoring and enforcement activities in all phases of offshore wind development post-auction and developer/lessee selection. BOEM's proposed Tribal Communication Plan, while important to identify tribal liaisons and consultation protocols and responsibilities, will be an important factor of the community-based technical working group, but is inadequate in itself for monitoring lease exploration, development, identification of critical data gaps, and enforcement. The Tribe recognizes the initial proposal for deployment of 15 wind turbines in the Humboldt Call Area represents an important pilot and case study model for future offshore wind energy development in an adaptive management framework off the Pacific Coast of the U.S.

There was discussion of potential impacts of offshore wind development and specific impacts of concern include:

- Potential habitat provided by wind turbines for anadromous fish,
- Concerns about wind farm cables snagging ghost fishing gear drifting in the water column or other materials and resulting in marine life entanglement, and
- Need for independent, robust long-term monitoring and enforcement, with critical data to better understand habitat changes due to wind farm development affecting traditional tribal fisheries in the ocean and rivers for salmon, steelhead, and lamprey eel.

Blue Lake Rancheria representatives discussed a need for responsible development, including emergency preparedness, such as response plans for mooring or inter-array cables breaking and response plans for natural hazards, such as earthquakes. Tribal representatives also raised the need to consider sea level rise when the Commission begins considering proposed cable landing locations and identified that the Commission may need to consider cable landing locations further inland and of sufficient elevation to ensure that they would be resilient to sea level rise for the entirety of an offshore wind project's operational phase, approximately 50 to 100 years. Finally, Blue Lake Rancheria representatives provided information on specific tribal cultural resources of importance around Humboldt Bay and indicated that these places could be inappropriate for cable landings or future Humboldt Harbor District development.

Wiyot Tribe Consultation

During staff discussions with the Wiyot Tribe, Wiyot representatives expressed concern about the potential impacts of offshore wind impacts on traditional tribal fisheries in the ocean and in the Eel River. Wiyot representatives also note that members of the Tribe work as commercial fishermen and will experience impacts through their participation in the fishing industry as well as through their experiences as tribal members. Impacts to the commercial fishing industry are described in section F of these findings.

Yurok Tribe Consultation

During staff discussions with the Yurok Tribe, Yurok representatives stated that the Tribe has never ceded their rights in the ocean, and that they continue to claim all of their rights; therefore, any projects in the ocean must be approved by the Yurok Tribe and move forward in partnership with the Yurok Tribe. The Yurok Tribe is opposed to the current BOEM process and seeks more inclusion and control of the California process. Yurok representatives also discussed how past energy projects, specifically hydroelectric dams and logging, have impacted the Yurok Tribe, without providing benefits and leaving the Yurok Tribe with the cleanup and work to decommission. Additionally, the Yurok representatives expressed a desire for continued engagement and collaboration as BOEM's offshore wind leasing process continues, and the importance of contracting with the Yurok Tribe to assess cultural resources or conduct cultural resource studies. While the Yurok Tribe has made clear that they do not have an official public position on a local offshore wind energy project and need more information on its impacts and carbon footprint; Yurok representatives indicated that if this process results in an offshore wind energy project, the Yurok Tribe wishes to receive appropriate benefits and mitigation, including clean electricity, from these offshore wind projects, as a portion of Yurok tribal members do not have access to electricity. Consultation included a discussion of potential impacts of offshore wind development, including:

- Viewshed changes impacting cultural landscapes and use of sacred sites, particularly specific high-elevation locations of cultural significance and prayer.
- Underwater sound and electromagnetic fields impacting fisheries, specifically eulachon, smelt, green sturgeon, and coho salmon.
- Underwater sound and light pollution impacting other forms of marine life, including whales and seabirds. Marbled murrelet was indicated to be of particular concern.
- Impacts on tourism, subsistence fishing, and public safety

The Yurok representatives explained that environmental impacts of offshore wind are disproportionately felt by the Yurok Tribe, when compared to the general public, because of the Tribe's medicinal and healing connection to the land and waters that has existed since time immemorial. Additionally, Yurok representatives expressed that it is concerning that BOEM has issued a Determination of "No Historic Properties Effected" for the section 106 process of the National Historic Preservation Act without properly taking into account Traditional Cultural Landscapes that will be affected by the project. This goes against Tribal Cultural Resources Management to evaluate the effect of

projects on non-archeological resources. Yurok representatives discussed the need to properly plan transmission for eventual offshore wind development up-front, including mitigation measures, and had concerns about where future transmission for these projects would go. Yurok representatives also indicated that economic development from future offshore wind projects could create growth-inducing impacts in the broader Humboldt Bay-area community and bring a need for more housing and services in an area that is already resourced strained and lacking in housing units. The Yurok representatives expect that these growth inducing impacts have the potential to negatively impact the Yurok Tribe. Finally, the Yurok Tribe requested the inclusion of its February 10, 2022 letter to BOEM on its Draft EA in our consultation records. A copy of the Yurok Tribe's letter is available in the substantive file documents.

**Lease Exploration Activities**

Section 30244 of the Coastal Act provides that where development could affect archaeological or paleontological resources, reasonable mitigation measures shall be required. The first component of an analysis under this section is to determine what, if any, archaeological (including tribal and cultural resources) or paleontological resources exist in the project vicinity that could be adversely impacted. Lease exploration activities within the Humboldt WEA are not expected to disturb archaeological sites, because the Humboldt WEA water depths are so deep that the area was not previously exposed as coastline and would not have submerged sites. However, BOEM's EA identifies that cable route survey activities or recovery of lost survey equipment along cable routes has the potential to impact submerged archaeological and cultural resources in water depths less than approximately 393 feet. Impacts to archaeological resources from seafloor disturbance would be avoided or mitigated by BOEM's requirement to only conduct bottom-disturbing geotechnical activities in locations where a geophysical survey has already been conducted by a qualified marine archaeologist. Additionally, to address unanticipated discovery of archaeological resources during seafloor disturbing activities, BOEM requires that lessees comply with the procedures in 30 CFR Section 585.802:

A. Immediately halting all seafloor disturbing activities within the area of discovery,

B. Notifying BOEM within 72 hours of the discovery, and keeping the location of the discovery confidential, and

C. Not taking any action that may adversely affect the resources until BOEM has made an evaluation in consultation with the culturally associated tribe(s) and instructed the lessee on how to proceed.

BOEM's requirements to address unanticipated discovery will mitigate impacts to submerged cultural or archaeological resources that are discovered in the process of lease exploration activities. Additionally, **Condition 6** requires BOEM to encourage lessees to demonstrate engagement with federally recognized and California Native American Tribes that could be affected by future offshore wind development on all elements of the lessees' project development process, including, but not limited to, a Workforce Plan, Survey and SAPs, and a COP. The Commission expects this engagement will include developing a protocol for communication directly with Tribes in

the event of an unanticipated discovery of a potential tribal resource as well as a post-discovery process for evaluation of a discovery. However, as discussed in the tribal consultation section above, the Blue Lake Rancheria, Wiyot Tribe, and Yurok Tribe have concerns about potential impacts of lease exploration to the marine ecosystem, including fish and marine mammals. These Tribes have indicated that these species are of cultural importance to them. As discussed in section E of these findings, fish and marine mammals may be impacted by underwater sound, increased entanglement risk, and ship strike risk. The measures BOEM already plans to require of lessees, and **Conditions 1, and 3**, will minimize or mitigate these impacts to the greatest extent feasible, thereby achieving Coastal Act consistency.

**Lease Development Activities**

Lease development activities in the Humboldt WEA have the potential to impact cultural landscapes, culturally important species, and archaeological sites. Potential impacts to cultural landscapes from the turbines themselves occur due to changes in viewshed. Additional impacts to cultural landscapes have the potential to occur through transmission upgrades and development, and port development in Humboldt Bay.

Viewshed

As described in the scenic and visual resources section, development of the Humboldt WEA will result in visible offshore wind development from the Humboldt coast. The Yurok Tribe has identified the need to have additional visual simulations done from viewpoints that are not along the coast and that are higher in elevation. The Yurok Tribe has indicated that changes to viewshed from high-elevation sacred sites will impact their tribal cultural landscapes. As part of Tribal engagement activities required by BOEM, and by the Commission under **Condition 6**, the Commission expects that BOEM's lessees will consult with Tribes to develop appropriate visual simulations that show the impact of lease development on tribal cultural landscapes and to develop appropriate avoidance and minimization measures as part of a proposed project. As discussed in section I, although this impact can be minimized, it is infeasible to eliminate it entirely, and the Commission expects that BOEM's lessees will work with Tribes to develop appropriate mitigation for visual impacts to tribal cultural landscapes. These impacts will be fully analyzed for consistency with the Coastal Act when Lessees submit a consistency certification for a specific proposed project to the Commission, as required by BOEM's regulations.

Culturally Important Species

Through consultation meetings, the Blue Lake Rancheria, Wiyot Tribe, and Yurok Tribe identified a number of species or types of marine life that are culturally important to their Tribes. This includes marine mammals such as whales, sea lions, seals and dolphins, a variety of seabirds, and fish such as salmon, steelhead, green sturgeon, smelt, eulachon, and eel. Changes to marine habitats from the installation of offshore wind turbines, their mooring lines, and anchors may impact the populations of these culturally important species, as described in section E. The Commission expects that BOEM's lessees will engage with Tribes in their research plans to better understand and minimize impacts to these culturally important species. In addition, as described above,

Commission staff will work with Tribes to incorporate tribal experts into future scientific research reviews to inform future design and monitoring of offshore wind development. This will provide Tribes with a seat at the table to inform project design and develop necessary research to assess future impacts.

Archaeological Sites

Lease development has the potential to impact historic shipwrecks and submerged archaeological sites. Future development to install export cables from the lease area to shore has the potential to impact submerged archaeological sites, as the cable route will cross areas of seafloor that were previously exposed and inhabited by Native Americans. Additionally, through Tribal consultation, the Commission has learned of specific places on the coast that are inappropriate for cable landings due to their cultural significance, as well as specific places within Humboldt Bay that are inappropriate for future development as part of future Humboldt Harbor District development to support offshore wind or otherwise, due to their cultural significance. The Commission expects that BOEM's lessees and future permit applications regarding cable landings or Humboldt Harbor District development will engage Tribes on their project proposals and ensure that proposed project locations are not disturbing historic properties/ historical resources of importance to Tribes.

Responsible Development

Throughout all of the tribal consultation meetings, the Commission heard an ongoing theme of the need for responsible development of offshore wind from initial data collection through decommissioning and removal, and the need to engage Tribes at every stage of project development. The Yurok Tribe has indicated an interest in bringing their scientists' expertise into offshore wind impacts assessment and an interest in participating in the design and review of research associated with offshore wind development. The Commission agrees that bringing tribal expertise and perspective into pre- and post- project development review will improve the overall process. As described above in Section B, Commission staff is working with BOEM and other federal and state agency staff to develop a structure and process for coordinated research review to inform future project development and regulatory review. We will also work with interested Tribal experts to determine how best to incorporate them into this process.

In the past, Tribes have borne the cost of energy generation projects without receiving the benefits that those projects could bring. As offshore wind is developed off Humboldt, it is critical that Tribes benefit from these projects, because they will be impacted in ways that cannot be fully eliminated. It will be important to avoid the historical "boom and bust" economic cycle experienced since colonization of California's North Coast (e.g., gold, timber, fish).

Additionally, some of the Tribes identified the need for resilient transmission infrastructure, particularly for resilience to sea level rise at the site where offshore wind electricity would be brought to shore. The Commission expects that future proposals for export cable routes to shore would be consistent with the Commission's sea level rise policy and would be resilient to sea level rise.

## L. ENVIRONMENTAL JUSTICE

Coastal Act Section 30604(h) states:

> *When acting on a coastal development permit, the issuing agency, or the Commission on appeal, may consider environmental justice, or the equitable distribution of environmental benefits throughout the state.*

Section 30604(h) provides for the Commission to evaluate environmental justice considerations when making permit decisions. As defined in Section 30107.3(a) of the Coastal Act, "environmental justice" means "the fair treatment and meaningful involvement of people of all races, cultures, incomes and national origins, with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."[21] Section 30107.3(b)(4) states that environmental justice includes, "[a]t a minimum, the meaningful consideration of recommendations from populations and communities most impacted by pollution into environmental and land use decisions."

In March 2019, the Commission adopted an environmental justice policy ("EJ Policy") to guide and inform its implementation of Section 30604(h) in a manner that is fully consistent with the standards in, and furthers the goals of, Chapter 3 of the Coastal Act and certified local coastal programs. The EJ Policy further articulates environmental justice as the following:

> *The term 'environmental justice' is currently understood to include both substantive and procedural rights, meaning that in addition to the equitable distribution of environmental benefits, underserved communities also deserve equitable access to the process where significant environmental and land use decisions are made.*

Ensuring access to the Commission's proceedings means making sure that those who are affected by proposed development have a meaningful and equitable opportunity to voice concerns in an open and transparent public process. Substantively, the EJ Policy describes how the Commission will work to ensure equitable access to the coast, support measures that protect existing affordable housing, and ensure that environmental justice communities are not disproportionately affected by climate change, water contamination, overuse or diminished environmental services.

Section 30604(h) is not an enforceable policy that is incorporated into the Commission's Coastal Management Program. However, the Commission has long used an environmental justice lens when analyzing projects' substantive consistency with Chapter 3 policies regarding public access and other coastal resources, and its EJ

[21] Coastal Act Section 30013, which provides that the Commission is to advance the principles of environmental justice and equality, references California Government Code section 65040.12(e), which defines "environmental justice" as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."

Policy calls for analyzing environmental justice issues in applicable staff reports and, when appropriate, proposing mitigation measures to avoid or fully mitigate identified impacts in a manner that is consistent with Chapter 3 policies. The Commission also has the mandate and the authority to maximize public participation in its decision-making process, including by ensuring that it solicits and carefully considers the viewpoints of communities that have been historically underserved or marginalized by government and that it ensures such communities have meaningful opportunities to be involved in the decision-making. (See, e.g., Coastal Act Sections 30006; 15 C.F.R. § 930.42.)

Staff evaluated environmental justice impacts resulting from lease activities and future development necessary to support offshore wind energy. Several issues regarding future benefits and burdens that may result from the project have been raised by Tribes in the region, stakeholders working with environmental justice communities, and other members of the public. These include substantive concerns on addressing environmental burdens and cumulative impacts in environmental justice communities, safety of Native American Tribes and local communities and community benefits from offshore wind (e.g., green jobs, access to clean energy). Procedural concerns have also been raised regarding early, regular, and transparent engagement with environmental justice communities that will continue through the life of offshore wind development. The Commission addresses these impacts in this section.

**Identifying Communities of Concern**

The Commission's EJ Policy was created to provide a framework to consider fair outcomes and requires staff to reach out to and include the voices of environmental justice community members[22] who have been historically marginalized in the governmental review process and whose households have been disproportionately burdened by environmental hazards often stemming from industrial development. In order to evaluate the distribution of the project's environmental burdens and benefits and cumulative impacts on communities of concern, it is critical to understand the existing socioeconomic and demographic profiles of those communities as well as existing environmental burdens. Here, the term "communities of concern" refers to low-income communities, communities of color, and other populations with higher exposure and/or sensitivity to adverse project impacts due to historical marginalization, discriminatory land use practices, and/or less capacity to mitigate adverse impacts. To identify these communities, staff evaluated various quantitative sources of information for the Humboldt Bay region which may be affected by lease sale activities and future development. Quantitative indicators used to identify communities of concern include the percentage of low-income households (either through the low-income definition from

[22] In this staff report, the terms "underserved communities" and "environmental justice communities" are used interchangeably with the term "communities of concern."

AB1550[23] or twice the federal poverty level),[24] housing burden,[25] population of color,[26] and linguistically isolated households.[27] Staff also used the CalEnviroScreen (CES) 4.0 index which identified areas with multiple sources of pollution and populations with high sensitivity to pollution.[28]

The Humboldt Bay region, originally known as Wigi or Wike by native Wiyot peoples who once dominated the population, has for years been predominantly white and low-income (Loud, 1918). There are communities of concern in the region, particularly given population characteristics in census tracts surrounding Humboldt Bay, including those for Arcata and Eureka, which is nearby the proposed Redwood Marine Terminal 1 site for Humboldt Harbor District development activities (See Tables 4-1 and 4-2 and **Exhibit 8-1**). Several of these census tracts rank highly for population characteristics in CES 4.0 compared to other census tracts in the state and are relatively diverse (see **Exhibit 8-2**). The data in Table 4-1 indicates that the population near the project region is highly sensitive to pollution and other possible impacts from large-scale development, including offshore wind energy nearby. The rates of cardiovascular disease and asthma are among the highest in California. Similarly, socioeconomic indicators such as unemployment and housing burden, which consider cost of housing and utilities, are in the top ten percentile for the state for some census tracts in the area adjacent to the Humboldt Harbor District port facilities (See Table 4-1). These same communities face high poverty based on the poverty indicator of households with income below twice the federal poverty level and have even more low-income households if using the AB 1550 definition of low-income, which holds a higher income threshold than the federal poverty level (**Exhibits 8-3, 8-4** and Tables 4-1, 4-2).

**Table 4-1. CES 4.0 Population Characteristics Indicators by Statewide Percentiles in Nearby Communities of Concern**

| Census Tracts | 602300 0100 | 602300 0400 | 602300 0500 | 60230 01000 | 6023001 | 602300 | 6023000 | Humboldt County |
|---|---|---|---|---|---|---|---|---|

[23] This analysis uses AB 1550 to identify “Low-income communities” as census tracts with median household incomes at or below 80 percent of the statewide median income or with median household incomes at or below the threshold designated as low-income by HCD’s State Income Limits adopted pursuant to Section 50093 of the Health and Safety Code. This provides a more reliable measure of low-income communities due to higher costs and wages in California than the Federal Poverty Level.
[24] A threshold of twice the federal poverty level was used in this analysis because California’s cost of living is higher than many other parts of the country.
[25] Housing burdened low-income households are households that are both low income and highly burdened by housings costs as identified by CalEnviroScreen 4.0 Households with lower incomes may spend a larger proportion of their income on housing and may suffer from housing-induced poverty.
[26] Population of color refers to anyone that identifies as Hispanic (of any race) and anyone who identifies as non-Hispanic but as a race other than white on the Census, such as Black or African American, Asian, or American Indian.
[27] Linguistic isolation is a term used by the US Census Bureau for limited English-speaking households. More than 40 percent of Californians speak a language other than English at home. About half of those do not speak English well or at all.
[28] CalEnviroScreen 4.0 identifies California communities most affected by pollution and ranks census tracts in California based on potential exposures to pollutants, adverse environmental conditions, socioeconomic factors and the prevalence of certain health conditions.

| | | | | | 300 | 1101 | 300 | Average |
|---|---|---|---|---|---|---|---|---|
| **Total Population** | 4,242 | 4,304 | 4,450 | 6,338 | 1,320 | 6,841 | 5,788 | 135,940 |
| **Cardio-vascular Disease** | 94% | 83% | 94% | 88% | 95% | 93% | 79% | 81% |
| **Asthma** | 94% | 76% | 93.83% | 72% | 80% | 75% | 74% | 69% |
| **Housing Burden** | 90% | 48% | 57% | 99.6% | 50% | 86% | 81% | 48% |
| **Unemployment** | 98% | 78% | 97% | 97% | 83% | 62% | 53% | 61% |
| **Pollution vulnerability** | 89% | 73% | 82% | 78% | 66% | 70% | 60% | N/A |
| **Poverty %** | 95% | 82% | 85% | 93% | 71% | 91% | 81% | 69% |

**Table 4-2. Race and Ethnicity in Nearby Communities of Concern**

| Census Tracts | 6023000 100 | 6023000 400 | 6023000 500 | 602300 1000 | 6023001 300 | 602300 1101 | 6023000 300 | Humboldt County Average |
|---|---|---|---|---|---|---|---|---|
| **Total Population** | 4,242 | 4,304 | 4,450 | 6,338 | 1,320 | 6,841 | 5,788 | 135,940 |
| **White** | 64% | 71% | 65.9% | 66.3% | 79.7% | 69.1% | 67% | 73% |
| **Hispanic** | 15.7% | 13.5% | 16.7% | 19.3% | 5.1% | 14.5% | 9% | 12% |
| **African American** | 4.9% | 1% | 6.7% | 3.7% | <1% | 1.4% | N/A | 1.5% |
| **Native American** | 4.8% | 6% | 3.5% | 2.6% | 1.6% | <1% | 1% | 6.4% |
| **Asian American** | 6.9% | 2.2% | 2.1% | 1.5% | 2.6% | 10.2% | 16.7% | 3% |
| **Other** | 3.5% | 6% | 5% | 6.5% | 10.2% | 4% | 6.4% | 6% |

While the history and connection to the environment of several California Native American Tribes are described in detail in section K of this report, the Commission also recognizes the environmental injustices and demographic and socioeconomic inequities that have resulted from this history of marginalization. Several Tribes in the region have high rates of poverty and low median wages. According to the Yurok Tribe, 80% of their members live below poverty line and have annual income of just over $11,000.[29] The census tract for the Hoopa Valley Reservation has a 95% rate of poverty and 80.69% unemployment compared to other tracts in the state (OEHHA, 2021). Additionally, there are higher rates of violence in several Tribal communities, which have also experienced

[29] Yurok Tribe comment letter to BOEM on Draft EA, February 10, 2022.

high rates of missing and murdered women in their communities. The U.S. Department of Justice found that Indigenous women face murder rates more than 10 times the national average, a crisis which is being documented as the Missing and Murdered Indigenous Women Girls and Two Spirit People (MMIW2GS).[30]

Along with the quantitative data collected, qualitative information and the lived experience of the community members is key to understanding existing environmental justice burdens on a community and the potential for new development to inadvertently exacerbate those impacts or create new burdens, and in some cases create community benefits. Commission staff reviewed public comment letters and videos from past BOEM hearings to identify stakeholders with concerns regarding environmental justice. Staff sent outreach emails to several of these groups and followed up with emails and phone calls. At the time of publishing this report, staff met with stakeholders from non-profits involved locally in coastal and environmental issues and statewide in environmental justice in renewable energy development. Commission staff also engaged in formal consultation with Tribes as described in section K.

Based on available sources of information, the Commission concludes that there are communities of concern within the identified geographies of potential impact that may be affected by project impacts who may experience disproportionate burdens, particularly low-income communities. The Commission's analysis of communities of concern in the region identifies that there are several areas near Humboldt Bay with significant Native American populations, communities of color, and low-income communities. Potential impacts to those communities that will be triggered by offshore WEA development both offshore and onshore and the Commission's ability to address those impacts warrant additional consideration.

**Environmental Justice Coastal Act Analysis**

Procedural concerns

Procedural concerns raised regarding the offshore wind lease activities and future development include transparent and equitable engagement with Tribes and environmental justice communities during offshore wind development and inclusion of stakeholders in environmental impact monitoring. To date, both BOEM and California state agencies have engaged with Tribes, fishing communities, and other members of the public in several efforts, which are summarized in section D and include formal Tribal consultation and virtual scoping meetings with the fishing community and public comment on the draft EA. Additionally, Commission staff have conducted independent Tribal consultation meetings and reached out to several stakeholders who have raised environmental justice concerns during scoping and public comment for the draft EA. Commission staff also created and sent a Frequently Asked Questions handout in February 2022 in English and Spanish to individuals interested in environmental justice via the Commission's EJ email list.

The Commission addresses several substantive concerns raised during these meetings throughout this consistency determination, but stakeholders have requested that BOEM and lessees establish additional measures for meaningful engagement during all stages

[30] Yurok Tribe and CORE HUB public comment letters to BOEM in February 2022.

of offshore wind scoping and energy generation. The Redwood Region Climate and Community Resilience Hub requested in its comments submitted on BOEM's draft EA that "BOEM develop strategies to specifically engage [Black, Indigenous, and People of Color] communities throughout all phases of the Humboldt WEA development going forward" to ensure offshore wind development has long-term community benefits and accountability and monitoring measures for lease activities and lessees.[30] Specific requests include establishing a regional community steering committee with representation from Tribes, communities of color, low-income communities and other disadvantaged communities and that the cost of future working groups and monitoring activities should be covered by BOEM, lessees, and/or developers.

Additionally, not all communities in the region have equitable access to information about the project or future activities, which also results in inequitable opportunity to meaningfully participate in discussions that may affect them. BOEM's EA and Commission staff analysis have identified populations in the region who do not speak English as their first language. The draft EA identifies that translation and interpretation services may be needed for individuals with limited English proficiency in the county's Latino community who may be affected by the project. Many of these individuals may not receive information in forms they understand because common channels of sharing information such as email noticing, are often in English and highly technical language. As such, targeted engagement should be conducted in consultation with trusted community partners to identify ways to disseminate information in an accessible format and to reach individuals with limited English proficiency.

Because offshore wind development in California is in the early scoping and planning stages, there is an opportunity to create fairer outcomes for Tribes and other underserved communities in the region by starting meaningful engagement from the beginning. To ensure meaningful engagement in future offshore wind development proposals that come before the Commission, either from BOEM, local governments, lessees or other future developers, the Commission expects meaningful engagement to be embedded in the project development process and input from communities of concern to be addressed in all project elements and documents submitted for Commission review. As such, **Condition 5** requires BOEM to encourage lessees to demonstrate long-term engagement with environmental justice communities identified in this section on all elements of a lessees' project development process. This condition as well as other requirements BOEM is likely to include in its leasing documents, do not prescribe a specific structure for engagement, but instead allow communities to work with lessees to determine what structure would achieve the engagement goals of all parties. The Commission recommends that lessees and communities explore mechanisms for compensating community members (who most often volunteer their time) for their time participating in engagement activities. **Condition 5** also requires that any engagement plan be developed in coordination with affected communities and that the plan include strategies to reach individuals with limited English proficiency who may be affected by future offshore wind development. Finally, **Condition 6** requires engagement with California Native American Tribes. This condition includes many of the same engagement elements as **Condition 5**, but also addresses issues unique to Tribes. See section K for additional discussion. Together, **Conditions 5 and 6** are needed to ensure that BOEM's project will protect special communities (per Section

30230 and 30253(e)); protect public access, views, and lower-cost recreational opportunities for EJ communities (per, e.g., Sections 30210, 30251, 30213), and protect marine resources that are used by EJ and tribal communities for cultural, economic, recreational, and subsistence purposes (per Section 30230).

Substantive Concerns

*Lease Exploration*

As discussed in BOEM's draft EA, lease exploration activities include an increase in vessel trips to and from Humboldt Bay for surveys and other lease exploration activities and installation of metocean buoys in the WEA. BOEM's EA analysis identifies the potential for environmental justice impacts related to air and water pollutants. Air emissions would result from vessels and powered equipment being used for lease activities, and would primarily consist of $NO_x$, $SO_2$, CO and PM. As discussed in the air quality section, BOEM does not expect lease exploration to violate any of Humboldt County's air quality standards. BOEM also does not expect adverse impacts to communities of concern around Humboldt Bay or further inland due to the limited scope and short duration of the activities.

There may also be instances where vessel fuel or other oil-based pollutants would be emitted or discharged in amounts that may result in harmful impacts to marine life due to foreseeable but unlikely events or emergencies. The impacts of oil spills are analyzed in the oil spill section. In these events, Tribal members and members of the fishing industry would be disproportionately impacted due to their dependence on ocean resources for food and their livelihood. Further discussion of tribal fisheries is included in the tribal and cultural resources section, and discussion of impacts to fishing communities is included in the commercial and recreational fishing section. To prevent and minimize the impacts of oil spills, the Commission expects BOEM's lessees to submit a project-specific spill prevention and response plan, as detailed in **Condition 1(f)(ii)**.

Additionally, while narrow in scope, the lease activities happening at this stage of the offshore wind development process will inform future construction operations plans, export cable routes to shore, lease terms, and onshore development needs, which may have unforeseen consequences to underserved communities dependent on ocean resources. To ensure that all possible impacts to communities of concern are proactively identified and addressed, **Condition 5 and 6**, as discussed above, require ongoing engagement with Tribes and environmental justice communities, and **Condition 1(d)** requires documents and data resulting from research, surveys, and other data collection efforts conducted during the leasing phase, that are subject to the Freedom of Information Act, to be publicly available to the maximum extent feasible to better inform impacts to local communities.

*Lease development*

Although currently no actual projects, designs, or other related development has been presented to either BOEM or to the Commission regarding future offshore wind development, a high-level analysis can be conducted to understand future impacts that may occur in environmental justice communities. This analysis provides a broad

understanding of what impacts can be reasonably foreseen and will also identify areas where more information is needed to adequately assess impacts. This analysis identifies the following substantive issues that may occur from future development activities: 1) addressing environmental burdens and cumulative impacts, 2) safety of Native American Tribes and local communities and 3) community benefits from offshore wind (e.g., green jobs, access to clean energy). Staff also consulted with Native American Tribes as described in section D. Several concerns relating to environmental justice came up during formal consultation meetings. section K of this report addresses Tribal concerns, but where relevant, overlapping concerns are also discussed below.

**1) Addressing future environmental burdens from offshore wind**: Future development related to construction of offshore wind facilities will likely have a variety of effects. Some effects will occur due to the redevelopment of the Redwood Marine Terminal facilities to accommodate offshore wind development and infrastructure buildout for offshore wind energy. Significant development will likely occur at the Humboldt Harbor District, which is closest to the Humboldt WEA and likely to be the location of staging for lease exploration activities as well as future onshore development for infrastructure needs. Redevelopment of the Redwood Marine Terminal may include, but is not limited to: demolition and removal of an existing 6-acre wood piling dock, development and construction of a 2,100 linear foot heavy lift marine terminal, wharf, and associated berth, construction of warehouses, fabrication and assembly buildings gantry cranes and a new assembly dock with a crane (Humboldt Harbor District, 2021). In its recent request for statements of qualification, the Humboldt Harbor District provided a conceptual figure of what redevelopment of the Redwood Marine Terminal could look like, which is included in **Exhibit 8-5**.

Ports have significant economic importance both locally and statewide. However, industrial activity and development at ports can result in significant environmental burdens for communities of concern living near ports, including air, water, noise and light pollution (EPA, 2021). This not only affects residents, but also workers and visitors who might recreate near port areas. Near the Redwood Marine Terminal area, there are several low-income communities and populations with additional sensitivities such as asthma and cardiovascular disease (See **Exhibits 8-1, 8-4** and Table 4-1) that may be exacerbated with additional pollution impacts in the area that may occur from Humboldt Harbor District expansion and future operations to support offshore wind energy generation. In 2016 the Commission approved an LCP amendment for affordable housing project that was later built next to the Redwood Marine Terminal in Samoa, increasing the number of low-income households in the area that should be considered in future development proposals and land use updates. As described in the Public Access Findings, Humboldt Harbor District development could also lead to a loss of lower-cost recreational boating opportunities and other water-based activities in the Bay.

Additional air pollution may occur from vehicle emissions on land and vessel emissions offshore. Road capacity in the Samoa area is limited and future harbor development has the potential to result in higher numbers of trucks delivering manufacturing, fabrication and assembly supplies to the Redwood Marine Terminal, affecting air quality for nearby communities of concern as well as communities further inland along transportation

routes. The air quality section discusses this potential impact in further detail. As discussed in the oil spill section, the construction and operation of offshore wind turbines uses oil-based lubricants and other products. This means that there is a foreseeable but unlikely chance that an oil spill may occur. A spill of oil, lubricant, or other hazardous liquid in the Humboldt Harbor District would disproportionately impact the nearby communities of concern identified above. Some census tracts around Humboldt Bay also have groundwater threats and hazardous waste sources that could be affected by soil mobilization from construction activities or other activities that may affect the site conditions (OEHHA, 2021). Coastal hazards including flooding from storms, tsunamis and sea level rise can further exacerbate these existing site conditions and mobilize contaminants beyond the source.

Currently, the extent of the air emissions, water pollutants, and possible mobilization of groundwater threats or hazardous waste burdens and how these sources of pollution may affect environmental justice communities in the region is unknown because future development proposals have not been submitted. However, the Commission expects future environmental assessments and monitoring plans from BOEM, lessees and other developers to include the extent of future impacts and identify avoidance and mitigation strategies addressing any environmental burdens that may affect communities of concern. Assessments should include population characteristics and current environmental conditions experienced by environmental justice communities that live, work, and/or recreate near sites of future development considerations and be validated with input from communities of concern through ongoing engagement as described in **Condition 5**.

**2) Safety of Native American Tribes and local communities:** As mentioned earlier, murder rates of Indigenous women are more than 10 times the national average and has been documented as the Missing and Murdered Indigenous Women Girls and Two Spirit People (MMIWG2), with some of the highest rates in California and the greatest concentration of cases within the state in Northern California, particularly Humboldt and Del Norte Counties (Yurok Tribal Court and Sovereign Bodies Institute, 2020). In comments to BOEM, the Yurok Tribe and the CORE Hub both expressed concerns regarding the potential for large scale energy infrastructure development in the region to exacerbate MMIWG2 and disproportionately burden indigenous communities.[30] These potential impacts can be proactively addressed by several measures in the early planning stages of future development. Specifically, the CORE Hub requests

> *Lease stipulations that will help protect the community and minimize potential for sexualized violence, kidnapping, trafficking, and murder…[and] could include background checks of licensee subcontractors, whistleblower policies, no tolerance policies, training, and other measures recommended by Tribal leaders, advocates, and policymakers working to end the epidemic of MMIWG2.*

The Commission expects future wind development to not only provide benefits to the community but also in a manner that does not continue to exacerbate harm in Native American communities and any additional vulnerable populations with limited resources to address these harms. The Commission expects that BOEM's lessees will develop

workforce plans with elements to ensure local community safety. These workforce plans should apply to all workers, including both direct employees and contractors. Workforce plan elements should include, but are not limited to, a plan for local hiring and minimizing the use of short-term or transient workers and a plan to address the challenges that come with large quantities of transient workers moving into a community.[31] These plans may also include zero tolerance policies, whistleblower protections, worker training on applicable policies, and other tools to promote workplace and community safety.

**Conditions 5 and 6** will ensure that Native American Tribes and environmental justice stakeholders can review and participate in the development of workforce plans.

**3) Community benefits**

Although future wind projects will have some impacts on environmental justice communities, they also have the potential to provide significant benefits to those communities in terms of providing clean energy and economic opportunities. As stated in AB 525: "Investment in offshore wind energy development can offer career pathways and workforce training in clean energy development. Offshore wind energy will provide additional blue collar industrial work opportunities and support apprenticeship opportunities for a diverse labor pool and provide those opportunities to local communities experiencing high unemployment through prioritization of local hiring first." In addition, construction of offshore wind facilities is critical to help the state achieve its aggressive clean energy goals and help avoid the worst effects of climate change, which will be felt most severely by low-income and other communities of concern that do not have the resources to adapt or avoid the impacts of climate change.

The project area's future exploration and possible development of offshore wind energy can bring a number of benefits to populations along the shore and in Humboldt Bay. As such, the Commission expects to see future project proposals for this area contain a co-developed community benefits package to ensure that communities of concern receive benefits from offshore wind, including access to clean energy, job training and employment opportunities, and more. This includes but should not be limited to mitigation of impacts to the fishing industry because there may be impacts to communities of concern beyond what will be experienced by those dependent on fishing for their livelihood. There should be targeted engagement and allocation of benefits for Tribes and other communities of concern in the region, particularly low-income households.

BOEM's lessees should engage with these communities to develop community benefits in a form that works for the communities and supports existing low-income families and individuals in an equitable way. There are many ways to do this, and community benefits agreements or packages is one way to articulate and agree to these benefits. Some examples from other community benefit packages in the green energy field include:

A. Community solar grants and incentives

[31] See e.g., https://publicintegrity.org/politics/murdered-and-missing-native-american-women-challenge-police-and-courts/

B. An equitable feed-in-tariff program for low-income communities that have solar panels and the infrastructure to sell energy

C. If there is a lack of infrastructure for this, lease applicants could explore creation of infrastructure as a community benefit

D. Low-income battery grants and incentives

E. Workforce development for fishing community, low-income, and Native American individuals

F. Equitable internships and apprenticeships throughout the project for low-income, youth, formerly incarcerated, neurodiverse, women, and people of color.

The above suggestions can support existing initiatives and strengthen communities that are facing several socioeconomic issues by providing additional benefits. Future exploration and development of the WEA could become an asset to the community and should also provide strong support for indigenous communities in Humboldt Bay and along the Klamath River. **Condition 5** will help ensure that potential benefits to local communities are maximized by calling on lease developers to engage with communities throughout the process of developing future projects and to develop workforce plans that will include a plan for local hiring and minimizing the use of short-term or transient workers in all phases of leasing and construction and operations.

### Conclusion

The Coastal Commission's EJ Policy was created to introduce a greater level of fairness to a government process that has historically excluded communities of color, low-income communities, and other underserved communities from participating in land use decisions that may cause disproportionate impacts to their households. The EJ Policy also provides a framework for the Commission to evaluate and address the equitable distribution of project benefits and burdens. In this case, the Commission has identified several communities of concern in Humboldt Bay region and identified several procedural and substantive concerns that should be addressed during lease activities and future development proposals. Offshore wind generation off the coast of California has the potential to bring several benefits to the state and the North Coast. However, without consideration of environmental justice at all stages of development and measures for meaningful engagement and accountability, communities of concern in the region may experience inequitable distribution of the project benefits and burdens. At a high level, the Commission expects BOEM, future lessees, and/or developers of offshore wind infrastructure to identify and address environmental burdens that may affect environmental justice communities in the region, ensure protections for safety of Native American Tribes and local communities, and develop community benefits packages, agreements, or other mechanisms to ensure that benefits are provided to affected communities and ensure meaningful engagement during all stages of offshore wind generation, as described by **Conditions 5 and 6**.

## M. AIR QUALITY

Coastal Act section 30253 states:

> *New development shall:….*
>
> *(3) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Control Board as to each particular development*

BOEM's EA indicates that Humboldt County is in attainment for all national ambient air quality standards and California ambient air quality standards with the exception of the state standard for 24-hour $PM_{10}$.[32] As stated in BOEM's EA:

> *Because Humboldt County has no stationary sources of air pollution on the corresponding OCS, it has not been designated as an Onshore Corresponding Area (OCA). Therefore, the U.S. Environmental Protection Agency (EPA) maintains jurisdiction over air quality management on the OCS offshore Humboldt County, in accordance with Section 328 of the Clean Air Act*

Both lease exploration and lease development may lead to changes in air quality, due to an increase in vessel traffic.

**Lease Exploration**

The marine vessels, auxiliary engines, buoy back-up generators, trucks and locomotives, and goods-moving equipment used for lease exploration activities have the potential to generate air quality contaminants. The primary air quality contaminants from these sources are carbon monoxide, nitrogen dioxide, sulfur dioxide, and fine particulate matter ($PM_{2.5}$), marine diesel, lube oils, and greenhouse gases. According to BOEM's EA:

> *Carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM are criteria pollutants that are regulated under the national ambient air quality standards, which are health-based standards. Marine diesel and lube oils may contain hazardous air pollutants, primarily benzene, and have adverse human health effects.*

BOEM does not provide a quantitative estimate of air quality pollutants expected to be generated by the use of the equipment mentioned above but has indicated that lease exploration activities are not expected to violate any national or California ambient air quality standards. It is worth noting that expected air pollutants associated with lease exploration activities do not include $PM_{10,}$ which is the only contaminant for which Humboldt County does not currently meet California ambient air quality standards.

As outlined in the CD, BOEM requires all appropriate federal, state, and local air quality regulations be followed by requiring lessees to obtain appropriate permits and implement mitigation measures where relevant. Therefore, lease exploration activities are expected to be consistent with the requirements imposed by an air pollution control district or the state air resources board, a thus consistent with section 30253 of the Coastal Act.

[32] $PM_{10}$ stands for particulate matter 10 microns or less.

**Lease Development**

Future lease development activities, particularly the construction and decommissioning phase, have the potential to produce air quality contaminants. The construction phase will produce emissions from marine vessels, turbine manufacturing equipment, and transportation of materials used for turbine manufacturing. Ongoing operations of offshore wind development will produce some air emissions from vessels traveling to/from the development for maintenance. The turbines themselves are not expected to produce substantial air emissions. The decommissioning phase of the offshore wind projects will bring additional air emissions due to the increased use of vessels to remove turbines, anchors, and mooring lines from the water.

The Humboldt Harbor District has expressed interest in redeveloping Redwood Marine Terminal 1 to facilitate offshore wind development. Many air emissions associated with turbine manufacturing and assembly have the potential to occur within Humboldt Bay. The town of Samoa is directly adjacent to the Redwood Marine Terminal 1 site, and, as discussed in section L, the communities near the proposed terminal redevelopment have disproportionate vulnerability and will likely bear disproportionate impacts of air emissions as a result of manufacturing and transport of materials required for manufacturing. The Commission expects that BOEM's lessees will involve communities in the lease development process to ensure that they are adequately protected from air pollutant emissions.

On the whole, lease development is expected to reduce California's reliance on fossil fuels for electricity, and will reduce the State's greenhouse gas emissions over the project's lifetime. It is foreseeable, but not certain, that lease development has the potential to lead to curtailment of gas fired power plants locally and would indirectly reduce air pollutant emissions.

## N. FILL OF COASTAL WATERS

Coastal Act Section 30233(a) states:

> *The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:*
>
> *(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.*
>
> *(7) Nature study, aquaculture, or similar resource dependent activities.*
>
> *…*

BOEM's proposed leasing of the Humboldt WEA would allow for installation and anchoring of up to three metocean buoys in the WEA. During the COP or lease development phase, lessees would propose installing numerous floating offshore wind

turbines, their associated anchors, substations, and inter-array cables as part of their development. Both of these activities constitute the placement of fill in open coastal waters and further discussion of each phase and its consistency with Section 30233(a) is provided below.

**Lease Exploration**

As mentioned above, the lease exploration phase would allow for the placement of up to three metocean buoys in the Humboldt WEA. According to BOEM, each buoy could require two anchors, although one anchor is more likely. Drag embedded anchors are expected to have a maximum footprint of 25 square feet on the seafloor. Thus, a conservative estimate of the seafloor space that could be taken up though the installation of buoys is 150 square feet. The proposed installation of up to three metocean buoys and six anchoring devices on the seafloor constitutes the placement of fill in open coastal waters and is therefore subject to the three-part test of Coastal Act Section 30233(a). The first test requires that the proposed activity must fit into one of seven categories of uses enumerated in Coastal Act Section 30233(a). The second test requires that there be no feasible less environmentally damaging alternative. The third test mandates that feasible mitigation measures be provided to minimize the project's adverse environmental effects.

Allowable Use Test

Two of the seven allowable uses of fill under 30233(a) include expanded energy facilities and nature study. Because the proposed anchoring devices would support future energy development and also study natural ocean conditions, the Commission finds that the proposed project meets the allowable use test of Coastal Act Section 30233(a).

Alternatives

The Commission must further find that there is no feasible less environmentally damaging alternative to the proposed placement of fill in open coastal waters. The purpose of the buoys is to collect information needed to inform design of offshore wind projects. The buoys will only be installed if the information is not available from an existing source. In addition, there are no known alternatives for collecting the type of information provided by the buoy that result in fewer impacts.

BOEM has not yet selected the type of metocean buoy, and thus the anchoring system, for this proposal. There are three different types of metocean buoys proposed to be used in the site assessment of the WEA: discus-shaped, boat-shaped, and spar buoys. Discus-shaped buoys and boat-shaped buoys are the two buoy types that would most likely be used for site assessment of wind areas. These buoy types are moored using solid cast-iron anchors, each weighing 11,000 pounds, that rest on the seafloor, and BOEM expects these anchors to have a footprint of six square feet. Spar buoys are less likely to be used for lease exploration; these buoys are moored using drag-embedded anchors. BOEM has proposed to deploy three metocean buoys which would be fixed to the seafloor using up to six total anchors (two anchors per buoy) at fixed locations in potential commercial lease areas. The largest total footprint of anchoring devices on the seafloor would equal 150 square feet (individual anchor footprint is 25 square feet).

Both anchoring systems (weighted and drag-embedded anchors) are relatively simple to install and remove which would minimize the seafloor disturbance compared to other anchoring systems that are permanent or require underwater drilling or pile driving. Finally, the maximum footprint on the seafloor (150 square feet) is very small relative to the size of the Humboldt WEA, 206 square miles. For these reasons, the Commission finds that the second test of Coastal Act Section 30233(a) has been met and that for this project, no less environmentally damaging feasible alternative exists.

Mitigation

The final requirement of Coastal Act Section 30233(a) is that filling of coastal waters may be permitted if feasible mitigation measures have been provided to minimize any adverse environmental effects associated with that fill. In prior sections of this report, the Commission has identified Conditions that would help minimize the adverse environmental effects associated with the placement of fill. As discussed, due to the small footprint of the proposed anchors over a large area, anticipated absence of sensitive habitat within their installation sites, the ability of soft substrate benthic organisms to quickly recover from small disturbance events (such as installation of anchors), and the regional abundance of soft substrate habitat similar to that expected to be found at the installation sites, the fill associated with the proposed anchors would not result in significant adverse environmental effects. To ensure feasible mitigation measures are implemented, **Condition 2** ensures that lessees avoid intentional bottom contact, including anchoring, within hard substrate, rock outcroppings, seamounts, or deep-sea coral and sponge habitat and requires a protective buffer around these sensitive habitats. In addition, **Condition 1(f)(iv)** includes an Anchoring Plan which would require detailed maps of anchoring sites (away from sensitive habitats) and anchor handling procedures that directs anchors to be placed and removed vertically to avoid anchor dragging. Furthermore, **Condition 1(f)(i)** requires Marine Wildlife Protection and Monitoring Measures which would require the use of a qualified marine wildlife observer during anchor installation that has the authority to halt operations if marine wildlife is observed or anticipated to be near a work area and installation activities have the potential to result in injury or entanglement of marine wildlife. This requirement would minimize the risk to marine wildlife associate with the proposed anchor installation activities.

With the incorporation of these conditions, the Commission finds that the third test of Coastal Act Section 30233(a) has been met and that proposed lease exploration activities within the Humboldt WEA are therefore consistent with Coastal Act Section 30233(a).

**Lease Development**

As discussed previously, there are no specific lease development projects in BOEM's current proposal. However substantial fill is expected in the future once lessees receive approval to move forward with offshore wind projects, and these projects will be subject to the three-part test of section 30233(a). Because it is not known where turbines, cables or other "fill" would be located, the Commission cannot analyze impacts or alternatives related to specific projects. However, it is important to analyze the potential consistency of foreseeable future activities at a broad scale now in order to determine if

there are any fundamental issues with moving forward toward lease development or if there is information or mitigation that must be gathered or imposed at this stage.

As stated at the beginning of this report, offshore wind projects are expected to include floating wind turbines which would be connected to anchors on the seafloor by at least three mooring lines. There are four possible types of anchor systems that could potentially be used, each with different levels of impact on the seafloor: drag-embedment, suction caissons, gravity anchor, and anchor piles. In addition to anchors, inter-array cables and cables bringing power to shore may also be buried or weighted to the seafloor, however the total footprint of these cables on the seafloor is unknown at this time. BOEM does not currently have an estimate of how many wind turbines would be deployed, and there is no current estimate of the amount of fill from anchoring systems or inter-array cables on the ocean floor, potential alternatives or feasible mitigation measures. However, all of these types of "fill" are allowable uses pursuant to Coastal Act Section 30233(a) because they relate to expanded energy and coastal-dependent industrial development. Analysis of alternative designs, cable routes, or siting locations for specific projects will have to occur later during siting phase and once lessees develop more specific proposals for specific technology that they will use. Likewise, most decisions regarding mitigation can only be made once there are specific proposals, designs, and known technologies. However, it is important that any fill is allowed only if there are not less damaging alternatives, and as explained elsewhere in these Findings, the development of offshore wind projects will have a variety of impacts on marine habitat, fisheries, and other resources. Accordingly, it is important to have BOEM begin the process of working with state agencies and the fishing community now to develop a process for mitigating the impacts that "fill" related to offshore wind will have on fishing interests, as required by **Condition 7**. The Commission will review future consistency certifications for consistency with Coastal Act Section 30233(a), and the Commission expects that BOEM's lessees will provide sufficient information about construction plans, anchoring and other fill to enable a comprehensive analysis.

## Citations List

Becker, E., Forney, K., Miller, D., Fiedler, P., Barlow, J., and Moore, J. (2020). Habitat-based density estimates for cetaceans in the California Current Ecosystem based on 1991-2018 survey data, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-638. https://swfsc-publications.fisheries.noaa.gov/publications/CR/2020/2020Becker1.pdf

Benjamins, S., Harnois, V., Smith, H.C.M., Johanning, L., Greenhill, L., Carter, C. and Wilson, B. 2014. Understanding the potential for marine megafauna entanglement risk from renewable marine energy developments. Scottish Natural Heritage Commissioned Report No. 791. https://ore.exeter.ac.uk/repository/bitstream/handle/10871/21616/Understanding?sequence=1

BOEM. (2021, July). *Northern California Area Identification Pursuant to 30 C.F.R. § 585.211(b)*. U.S. Department of Interior. https://www.boem.gov/sites/default/files/documents/regions/pacific-ocs-region/renewable-energy/3799_CA%20Area%20ID%20Humboldt%20County%20Memo%20Final.pdf

Braithwaite, V., & Boulcott, P. (2007). Pain perception, aversion and fear in fish. *Diseases of Aquatic Organisms*, *75*, 131–138. https://doi.org/10.3354/dao075131

Bredmose, H. (2020, April). *Definition of the IEA 15 MW Wind Turbine and its Use in Corewind* [Slides]. CoreWind. https://corewind.eu/wp-content/uploads/files/presentations/Definition-of-the-15-MW-wind-turbine.pdf

Buckley, R. (1989). Habitat Alterations as a Basis for Enhancing Marine Fisheries. *CalCOFI*, *30*. https://calcofi.com/publications/calcofireports/v30/Vol_30_Buckley.pdf

Bureau of Ocean Energy Management. (2018). *Outreach Summary Report: California Offshore Wind Energy Planning*. BOEM. https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/CA/Outreach-Summary-Report-September-2018.pdf

Bureau of Ocean Energy Management. (2019). *California Visual Simulation*. https://www.boem.gov/renewable-energy/state-activities/california-visual-simulation

Bureau of Ocean Energy Management. (2021, June). *Outreach Summary Report Addendum: California Offshore Wind Energy Planning*. BOEM. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Offshore-Wind-Outreach-Addendum.pdf

Bureau of Ocean Energy Management. (2022, January). *Draft Environmental Assessment: Commercial Wind Lease and Grant Issuance and Site Assessment Activities on the Pacific Outer Continental Shelf, Humboldt Wind Energy Area, California*. BOEM. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Humboldt-DraftEA.pdf

Bureau of Ocean Energy Management. (2022a, January). *Consistency Determination For Leasing Wind Energy Areas Offshore Humboldt County, California*. BOEM. https://documents.coastal.ca.gov/assets/upcoming-projects/offshore-

wind/Humboldt-CD.pdf#:~:text=In%20accordance%20with%20the%20Federal%20Coastal%20Zone%20Management,California%20Coastal%20Act%20of%201976%2C%20as%20amended%20%28CCA%29.

California Office of Environmental Health Hazard Assessment (OEHHA). (2021, October). *CalEnviroScreen (CES) 4.0*. https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40

California Energy Commission. (2021, May). *A Peek at Net Peak*. CEC. https://www.energy.ca.gov/data-reports/energy-insights/peek-net-peak

California Energy Commission, California Public Utilities Commission, & California Air Resources Board. (2021, September). *2021 SB 100 Joint Agency Report Summary: Achieving 100% Clean Electricity in California*. CEC.

California Department of Fish and Game. (2002, August). *Nearshore Fishery Management Plan*. CDFW. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=33925&inline

California Department of Fish and Wildlife. (2019). Pink (Ocean) Shrimp, *Pandalus jordani*, Enhanced Status Report.

California Department of Fish and Wildlife. (2019a). *Poundage and Value of Commercial Landings by Port* [Table]. Final California Commercial Landings

California Department of Fish and Wildlife (2019b). *Northern California.*

California Department of Fish and Wildlife. (2022). *California Commercial Market Squid Landing Receipt Data*. CDFW. https://wildlife.ca.gov/Conservation/Marine/Pelagic/Market-Squid-Landing

California Natural Resources Agency. (2018, January). *Safeguarding California Plan: 2018 Update*. https://resources.ca.gov/CNRALegacyFiles/docs/climate/safeguarding/update2018/safeguarding-california-plan-2018-update.pdf

California Office of Environmental Health Hazard Assessment (OEHHA). (2021, October). *CalEnviroScreen (CES) 4.0*. https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40

California State Lands Commission. (2022, February). *Geophysical Survey Permit Program*. SLC. https://www.slc.ca.gov/ogpp/

Carretta J., Greenman J., Wilkinson K., Freed J., Saez L., Lawson D., Viezbicke J., and Jannot J. (2021). Sources of Human-related Injury and Mortality for U.S. Pacific West Coast Marine Mammal Stock Assessments, 2015-2019. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-643. https://repository.library.noaa.gov/view/noaa/29973

*Commercial Fishing*. (2018). Port of New Bedford. https://portofnewbedford.org/commercial-fishing/

Connell, S. D. (2000). Floating pontoons create novel habitats for subtidal epibiota. *Journal of Experimental Marine Biology and Ecology*, *247*(2), 183–194. https://doi.org/10.1016/s0022-0981(00)00147-7

Costa-Pierce, B. A., & Bridger, C. J. (2002). The role of marine aquaculture facilities as habitats and ecosystems. *Responsible Marine Aquaculture*, 105–144. https://doi.org/10.1079/9780851996042.0105

Coy, Owens. (1929). *The Humboldt Bay Region 1850-1875*. California State Historical

Association. Los Angeles, CA. https://archive.org/details/humboldtbayregio00coyo

Curtis, Edward S. (1924). *The North American Indian, Volume Thirteen*. Norwood: The Plimpton Press. https://www.yosemite.ca.us/library/curtis/introduction.html

Dale, Harrison C. (1941). *The Ashley-Smith Explorations and the Discovery of a Central Route to the Pacific, 1822-1829*. The Arthur C. Clarke Company, Cleveland, OH. https://archive.org/details/ashleysmithexplo0000dale/page/n15/mode/2up

DeAlteras, J. T., Kilpatrick, B. D., & Rheault, R. B. (2004). A Comparative Evaluation of the Habitat Value of Shellfish Aquaculture Gear, Submerged Aquatic Vegetation and a Non-Vegetated Seabed. Journal of Shellfish Research, 23(3), 867-874. https://www.researchgate.net/publication/279569781_A_comparative_evaluation_of_the_habitat_value_of_shellfish_aquaculture_gear_submerged_aquatic_vegetation_and_a_non-vegetated_seabed

Dempster, T., & Taquet, M. (2004). Fish aggregation device (FAD) research: gaps in current knowledge and future directions for ecological studies. *Reviews in Fish Biology and Fisheries*, *14*(1), 21–42. https://doi.org/10.1007/s11160-004-3151-x

Dick, D. (2016). *Spatio-Temporal Analysis and Modeling in the Marine Environment: Humpback Whale Genetic Variability and Seabird Distributions in the Northeastern Pacific Ocean.* Oregon State University.

Elsasser, Albert B. (1978). *Wiyot*. In: *Handbook of the North American Indians, Volume 8*. Smithsonian Institution. Washington, D.C.

Environmental Protection Agency. (2021, July). *Environmental Justice Primer for Ports: Impacts of Port Operations and Goods Movement*. US EPA.

ESS Group, Inc. (2019, June). *Meteorological Conditions Report Humboldt Offshore Wind Energy Call Area*. https://www.boem.gov/sites/default/files/documents/regions/pacific-ocs-region/renewable-energy/Humboldt%20Call%20Area%20Met%20Report.pdf

Exec. Order No. B-55-18. (2018). https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf.

Glasby, T. (1999). Differences Between Subtidal Epibiota on Pier Pilings and Rocky Reefs at Marinas in Sydney, Australia. *Estuarine, Coastal and Shelf Science*, *48*(2), 281–290. https://doi.org/10.1006/ecss.1998.0417

Global Warming Solutions Act, Assembly Bill 32. (Nunez, Chapter 488, Statutes of 2006). https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=200520060AB32

Global Wind Energy Council. (2021). *Global Wind Report 2021*. GWEC. https://gwec.net/global-wind-report-2021/

Grantham, Theodore (University of California, Berkeley). (2018). North Coast Summary Report: California's Fourth Climate Change Assessment. https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-001_NorthCoast_ADA.pdf

Harnois, V., Smith, H. C., Benjamins, S., & Johanning, L. (2015). Assessment of entanglement risk to marine megafauna due to offshore renewable energy mooring systems. *International Journal of Marine Energy*, *11*, 27–49. https://doi.org/10.1016/j.ijome.2015.04.001

Henkel, S., Northwest National Marine Renewable Energy Center, & Oregon State University. (2016, November). *Assessment of Benthic Effects of Anchor Presence and Removal: A study conducted on the Oregon Central Coast*. Ocean Wave Energy Trust. https://tethys.pnnl.gov/sites/default/files/publications/Assessment_of_Benthic_Effects_of_Anchor_Presence_and_Removal_0.pdf

Hiezer, Robert F. and John E. Mills. (1991). *The Four Ages of Tsurai: A Documentary History of the Indian Village on Trinidad Bay*. Trinidad Museum Society, Trinidad, CA. https://archive.org/details/fouragesoftsurai00heiz

Hildebrandt, W.R. (1981). Native Hunting Adaptations on the North Coast of California. Ph.D. Dissertation. University of California. Davis, CA.

Hoopes, Chad L. (1971). *Lure of Humboldt Bay Region: Early Discoveries, Explorations and Foundations Establishing the Bay Region*. Kendall Hunt Publishing, Dubuque, IA.

Hughes, T., Bellwood, D., Folke, C., Steneck, R., & Wilson, J. (2005). New paradigms for supporting the resilience of marine ecosystems. *Trends in Ecology & Evolution*, *20*(7), 380–386. https://doi.org/10.1016/j.tree.2005.03.022

Humboldt Bay Harbor Recreation and Conservation District. (2021, November). *Redwood Marine Multipurpose Terminal Replacement Project*. Humboldt Bay Harbor.http://humboldtbay.org/sites/humboldtbay2.org/files/7591.21%20HBHRCD%20Multipurpose%20Terminal%20Replacement%20RFQ%2020211118_WithAttachments_0.pdf

Humboldt State University. (2018, August). *Humboldt County Humboldt Bay Area Plan - Sea Level Rise Policy Background Study*. https://digitalcommons.humboldt.edu/cgi/viewcontent.cgi?article=1015&context=hsuslri_local

Hutchison, Z.L., D.H. Secor, and A.B. Gill. (2020). The interaction between resource species and electromagnetic fields associated with electricity production by offshore wind farms. Oceanography 33(4):96–107, https://doi.org/10.5670/oceanog.2020.409.

ICF International, Southeastern Archaeological Research, and Davis Geoarchaeological Research. (2013, November). *Inventory and Analysis of Coastal and Submerged Archaeological Site Occurrence on the Pacific Outer Continental Shelf*. Prepared for Pacific OCS Region, Bureau of Ocean Energy Management, U.S. Department of the Interior. https://tethys.pnnl.gov/sites/default/files/publications/ICF2013.pdf

*Itinerary: Lighthouses of California's North Coast*. (2019, July). North of Ordinary CA. https://northofordinaryca.com/blog/itinerary-lighthouses-north-coast-california/

Johnson, J.A., J. Storrer, K. Fahy, and B. Reitherman. (2011, September). Determining the Potential Effects of Artificial Lighting from Pacific Outer Continental Shelf (POCS) Region Oil and Gas Facilities on Migrating Birds. Bureau of Ocean Energy Management. Camarillo, CA. https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Pacific-Region/Studies/OCS-Study-BOEMRE-2011-047.pdf

Kelsey, E. C., Felis, J. J., Czapanskiy, M., Pereksta, D. M., & Adams, J. (2018). Collision and displacement vulnerability to offshore wind energy infrastructure

among marine birds of the Pacific Outer Continental Shelf. *Journal of Environmental Management*, *227*, 229–247. https://doi.org/10.1016/j.jenvman.2018.08.051

Kroeber, Alfred L. (1976). *Handbook of the Indians of California*. Dover Publications. New York, NY. https://archive.org/details/handbookofindian00kroe

Kroeber, Alfred L. (1976). *Yurok Myths*. Berkeley: University of California Press. https://archive.org/details/yurokmyths00kroe

Kroeber, Alfred L. and E.W. Gifford. (1949, November). "World Renewal: A Cult System of Native Northwest California." *Anthropological Records* 13, no. 1: 1-156.

Laist, D. W., Knowlton, A. R., Mead, J. G., Collet, A. S., & Podesta, M. (2001). Collisions Between Ships and Whales. *Marine Mammal Science*, *17*(1), 35–75. https://doi.org/10.1111/j.1748-7692.2001.tb00980.x

Leirness JB, Adams J, Ballance LT, Coyne M, Felis JJ, Joyce T, Pereksta DM, Winship AJ, Jeffrey CFG, Ainley D, Croll D, Evenson J, Jahncke J, McIver W, Miller PI, Pearson S, Strong C, Sydeman W, Waddell JE, Zamon JE, Christensen J. (2021). Modeling at-sea density of marine birds to support renewable energy planning on the Pacific Outer Continental Shelf of the contiguous United States. Camarillo (CA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2021-014. p. 385. https://espis.boem.gov/final%20reports/BOEM_2021-014.pdf

Lenberg, T. (2021, September). *23,000-Year-Old Human Footprints Discovered in America*. Discovery. https://www.discovery.com/science/new-23-000-year-old-human-footprints-discovered-in-america

Lindsay, Brendan C. (2012). *Murder State: California's Native American Genocide, 1846-1873*. University of Nebraska Press, Lincoln Nebraska. https://archive.org/details/iuizi4rpyrpjvufh3etozm6m5xmzk6pfj9z1mpeh

Loud, Llewellyn L. (1918, December). "Ethnography and Archaeology of the Wiyot Territory." *University of California Publications in American Archaeology and Ethnology* 14, no. 3: 221-436.

Love, M. S., Nishimoto, M. M., Clark, S., McCrea, M., & Bull, A. S. (2016). Renewable Energy in situ Power Cable Observation. U.S. Department of the Interior, Bureau of Ocean Energy Management, Pacific OCS Region, Camarillo, CA. OCS Study 2016-008. 86 pp. https://tethys.pnnl.gov/sites/default/files/publications/BOEM-2016-008_0.pdf

Love, M. S., Nishimoto, M. M., Clark, S., McCrea, M., & Bull, A. S. (2017). Assessing potential impacts of energized submarine power cables on crab harvests. *Continental Shelf Research*, *151*, 23–29. https://doi.org/10.1016/j.csr.2017.10.002

Marine Life Protection Act. (2000). https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=FGC&division=3.&title=&part=&chapter=10.5.&article=

Maxwell, S. M., Kershaw, F., Locke, C. C., Conners, M. G., Dawson, C., Aylesworth, S., Loomis, R., & Johnson, A. F. (2022). Potential impacts of floating wind turbine technology for marine species and habitats. *Journal of Environmental Management*, *307*, 114577. https://doi.org/10.1016/j.jenvman.2022.114577

McKindsey, C. W., Thetmeyer, H., Landry, T., & Silvert, W. (2006). Review of recent

carrying capacity models for bivalve culture and recommendations for research and management. *Aquaculture*, *261*(2), 451–462. https://doi.org/10.1016/j.aquaculture.2006.06.044

Mishnaevsky, L., & Thomsen, K. (2020). Costs of repair of wind turbine blades: Influence of technology aspects. *Wind Energy*, *23*(12), 2247–2255. https://doi.org/10.1002/we.2552

Moratto, Michael J. (1984). *California Archaeology*. Academic Press, INC. Orlando FL. https://archive.org/details/californiaarchae0000mora

National Marine Fisheries Service. (2021, March). *2020 West Coast Whale Entanglement Summary*. NOAA. https://media.fisheries.noaa.gov/2021-03/2020_West_Coast_Whale_Entanglement_Summary.pdf?VersionId=null

National Marine Fisheries Service 2021 Fisheries of the United States. (2019). U.S. Department of Commerce, NOAA Current Fishery Statistics. https://media.fisheries.noaa.gov/2021-05/FUS2019-FINAL-webready-2.3.pdf?null=

North Coast Fishermen's Mapping Project. (2022). Humboldt Fishermen's Marketing Association, Ocean Protection Council, Crescent City Commercial Fishermen's Association, and Salmon Trollers Marketing Association.

Northwest Fisheries Science Center, National Marine Fisheries Service, & National Oceanic and Atmospheric Administration. (2019, June). *Pacific Coast Groundfish Fishery Management Plan Appendix C Part 2*. Pacific Fishery Management Council. https://www.pcouncil.org/documents/2019/06/groundfish-fmp-appendix-b-part-2.pdf/

Office of Energy Efficiency and Renewable Energy. (2021, August). *Wind Turbines: the Bigger, the Better*. Energy.Gov. https://www.energy.gov/eere/articles/wind-turbines-bigger-better

Office of Energy Efficiency and Renewable Energy. (2021a). *Offshore Wind Market Report: 2021 Edition*. Energy.gov. https://www.energy.gov/sites/default/files/2021-08/Offshore%20Wind%20Market%20Report%202021%20Edition_Final.pdf

Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. (2018, May). *Indicators of Climate Change in California.* https://oehha.ca.gov/media/downloads/climate-change/report/2018caindicatorsreportmay2018.pdf.

Optis, Mike, Alex Rybchuk, Nicola Bodini, Michael Rossol, and Walter Musial. 2020. 2020 Offshore Wind Resource Assessment for the California Pacific Outer Continental Shelf. Golden, CO: National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy21osti/77642.pdf.

Pacific Northwest Seismic Network. (2022). *Cascadia Subduction Zone*. PNSN. https://www.pnsn.org/outreach/earthquakesources/csz

Point Blue Conservation Science. (2022). Environmental Data Catalog for the Humboldt Wind Energy Area. Unpublished Report to the California Ocean Protection Council. Point Blue Conservation Science (Contribution No. 2387), Petaluma, CA.

Pilling, Arnold, R. (1978). *Yurok*. In: *Handbook of the North American Indians, Volume 8*. Smithsonian Institution. Washington, D.C.

Pomeroy, C., Thomson, C., and Stevens, M. (2010) Eureka Fishing Community Profile. ERKprofile.pdf (ucsd.edu)

Redwood Coast Tsunami Work Group. (2022). *What is a tsunami?* Humboldt State University. https://rctwg.humboldt.edu/tsunamis-warnings/tsunamis

Relini G, Biagi F, Serena F, Belluscio A, Spedicato MT, Rinelli P, Follesa MC, Piccinetti C, Ungaro N, Sion L, Levi D. (2000). Selachians fished by otter trawl in the Italian Seas. Biologia Marina Mediterranea 7:347–384.

Rockwood, R. C., Calambokidis, J., & Jahncke, J. (2017). High mortality of blue, humpback and fin whales from modeling of vessel collisions on the U.S. West Coast suggests population impacts and insufficient protection. *PLOS ONE*, *12*(8), e0183052. https://doi.org/10.1371/journal.pone.0183052

SEER (U.S. Offshore Winds Synthesis of Environmental Effects Research), Pacific Northwest National Laboratory, & National Renewable Energy Laboratory. (2021). *Underwater Noise Effects on Marine Life Associate with Offshore Wind Farms* [Webpage]. SEER.https://tethys.pnnl.gov/summaries/underwater-noise-effects-marine-life-associated-offshore-wind-farms.

Selley, R. C., & Sonnenberg, S. A. (2014). *Elements of Petroleum Geology* (3rd ed.). Academic Press.

Senate Bill 32 (Pavley, Chapter 249, Statutes of 2016). https://www.energy.ca.gov/programs-and-topics/topics/energy-infrastructure-and-environment/environmental-information-energy

Siddagangaiah, S., Chen, C., Hu, W., & Pieretti, N. (2021). Impact of pile-driving and offshore windfarm operational noise on fish chorusing. *Remote Sensing in Ecology and Conservation*, *8*(1), 119–134. https://doi.org/10.1002/rse2.231

Solick, D. I., & Newman, C. M. (2021). Oceanic records of North American bats and implications for offshore wind energy development in the United States. *Ecology and Evolution*, *11*(21), 14433–14447. https://doi.org/10.1002/ece3.8175

Southwest Fisheries Science Center. (2020, September). *New Research Reveals Clearer Picture of Upwelling That Feeds West Coast Marine Ecosystem*. NOAA. https://www.fisheries.noaa.gov/feature-story/new-research-reveals-clearer-picture-upwelling-feeds-west-coast-marine-ecosystem

Stantec Consulting Services Inc. (2018, November). *Biological Resources: Humboldt Wind Energy Project Bat Acoustic Monitoring Report, Humboldt County, California Appendix L*. Humboldt Wind, LLC. https://humboldtgov.org/DocumentCenter/View/72236/L-Biological-Resources-Bat-Acoustic-Monitoring-Report-Humboldt-County-Ca-Mar-2018Oct-2018

State of California, Governor Newsom. (2020). Executive Order N-79-20. https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf

The Status of U.S. Fisheries - Coonstriped Shrimp. (2009). California Department of Fish and Wildlife. https://repository.library.noaa.gov/view/noaa/15612

Sweet, et al. (2022). *Global and Regional Sea Level Rise Scenarios for the United States: Updated Mean Projections and Extreme Water Level Probabilities Along U.S. Coastlines.* National Oceanic and Atmospheric Administration. https://oceanservice.noaa.gov/hazards/sealevelrise/noaa-nos-techrpt01-global-regional-SLR-scenarios-US.pdf

Toulotte, M. (2021, December). *Floating Offshore Wind: The Top Five Technical Challenges to Deploying at Scale*. North American Windpower. https://nawindpower.com/floating-offshore-wind-the-top-five-technical-challenges-to-deploying-at-scale

*Tsunamis*. (2018, October). NOAA. https://www.noaa.gov/education/resource-collections/ocean-coasts/tsunamis

United States Coast Guard. (2018, March). *BOEM's Offshore Wind and Maritime Industry Knowledge Exchange* [Slides]. U.S. Homeland Security. https://www.boem.gov/sites/default/files/renewable-energy-program/Navigational-Risk-Assessments-and-U-S-Coast-Guard-Responsibilities.pdf

Vanderlaan, A.; Taggart, C. (2007). Vessel Collisions with Whales: The Probability of Lethal Injury Based on Vessel Speed. *Marine Mammal Science,* 23(1), 144-156. **https://doi.org/10.1111/j.1748-7692.2006.00098.x**

Vanermen, N., Courtens, W., Daelemans, R., Lens, L., Müller, W., van de Walle, M., Verstraete, H., & Stienen, E. W. M. (2019). Attracted to the outside: a meso-scale response pattern of lesser black-backed gulls at an offshore wind farm revealed by GPS telemetry. *ICES Journal of Marine Science*, *77*(2), 701–710. https://doi.org/10.1093/icesjms/fsz199

Waterman, Thomas T. (1920, May). "Yurok Geography." *University of California Publications in American Archaeology and Ethnology* 16, no. 5: 177-314. https://archive.org/details/yurokgeography00wate

WindEurope. (2021, February). *Offshore Wind in Europe: Key trends and statistics 2020*. https://windeurope.org/intelligence-platform/product/offshore-wind-in-europe-key-trends-and-statistics-2020/

Yurok Tribal Court & Sovereign Bodies Institute. (2020, July). *To' Kee Skuy' Soo Ney-Wo-Chek': I Will See You Again in a Good Way Progress Report*. https://2a840442-f49a-45b0-b1a1-7531a7cd3d30.filesusr.com/ugd/6b33f7_c7031acf738f4f05a0bd46bf96486e58.pdf

30 CFR 585.802. (2018). https://www.law.cornell.edu/cfr/text/30/585.802