

Executive Summary



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ES.1 Introduction

In December 2022, the Bureau of Ocean Energy Management (BOEM) auctioned Commercial Leases OCS-P 0561, 0562, 0563, 0564, and 0565 offshore California. Two leases are offshore Northern California, near Humboldt Bay. The other three leases are offshore Central California, near Morro Bay (Figure ES-1). These leases total over 373,000 acres (about 583 square miles). They are the first wind energy leases offshore California and are anticipated to use floating foundations that anchor in waters from 1,640 to 4,265 feet (500 to 1,300 meters) deep.

All leases grant the lessees the exclusive right to submit Construction and Operation Plans (COP) to BOEM proposing the construction, operation, and decommissioning of offshore wind energy facilities in the leased areas. BOEM identified these leased areas for consideration in development of commercial-scale offshore wind energy projects, subject to the appropriate reviews and approvals, through an extensive data-gathering and engagement process that included the BOEM California Intergovernmental Renewable Energy Task Force, which includes the state of California and numerous Tribal Nations, federal agencies, and local governments.

This Draft Programmatic Environmental Impact Statement (PEIS) analyzes the potential impacts of wind energy development in the five leased areas offshore California and considers mitigation measures that can be implemented to avoid or reduce those impacts. BOEM's Proposed Action for this PEIS is the identification of programmatic mitigation measures to lessen environmental impacts of wind energy development in the leased areas. BOEM may require mitigation measures as conditions of approval for activities proposed by lessees in their COPs.

BOEM may require all, some, or additional measures before approving a specific COP if the environmental analysis warrants. This PEIS will neither analyze a specific COP nor result in the approval of any construction and operation activities.

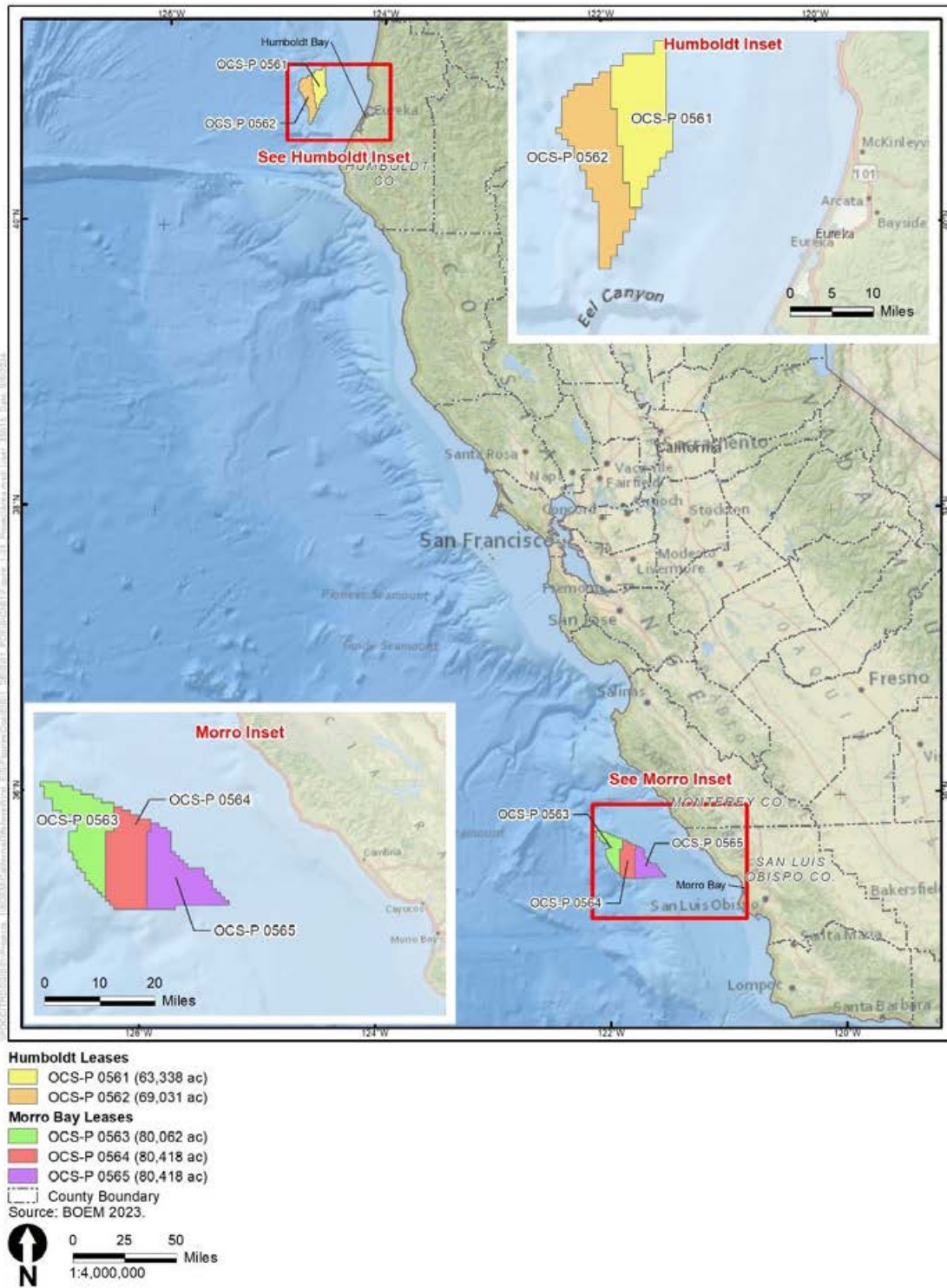


Figure ES-1. Humboldt and Morro Bay leased areas

ES.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to identify and analyze potential mitigation measures that BOEM can, but may not necessarily, require as conditions of approval for future COPs or that lessees can incorporate directly into their COPs. BOEM will conduct subsequent site-specific National Environmental Policy Act (NEPA) analyses and consultations for individual proposed wind energy projects that focus on the impacts of approving a particular COP, including identification of mitigation measures that are best suited for that project.

Lessees may also incorporate mitigation measures into their proposed COPs in addition to any measures they may develop independently. Project-specific environmental analysis for individual project COPs may tier to or incorporate by reference this PEIS.

This PEIS will help BOEM make timely decisions on COPs submitted by lessees for the Humboldt and Morro Bay leased areas. Timely decisions further the United States' policy to make Outer Continental Shelf (OCS) energy resources available for expeditious and orderly development, subject to environmental safeguards. Wind energy development in the leased areas will assist with meeting federal and state renewable energy goals. These include the federal government's goals of deploying 30 gigawatts of offshore wind energy capacity by 2030 and 15 gigawatts of floating offshore wind capacity by 2035 and the State of California's goal of generating 2 to 5 gigawatts of offshore wind energy by 2030.

ES.3 Public Involvement

On December 20, 2023, BOEM issued a Notice of Intent to prepare a PEIS consistent with NEPA regulations (42 U.S. Code § 4321 et seq.) to assess the potential impacts of the Proposed Action and alternatives (88 *Federal Register* 88107). The Notice of Intent commenced a public scoping process to identify issues, alternatives, and mitigation measures for consideration in the PEIS. The formal scoping period was from December 20, 2023, through February 20, 2024. BOEM held two virtual public scoping meetings on February 6 and 8, 2024. Throughout the scoping period, federal agencies, Tribes, state and local governments, and the public had the opportunity to help BOEM identify potentially significant resources and issues, impact-producing factors, a range of reasonable alternatives, and potential mitigation measures to analyze in the PEIS, as well as provide additional information. The Notice of Intent requested comments from the public in written form, delivered by mail or delivery service, or through the regulations.gov web portal through searching for Docket Number BOEM-2023-0061. BOEM also used the scoping process to initiate the consultation process under Section 106 of the National Historic Preservation Act (54 U.S. Code § 300101 et seq.), as permitted by 36 Code of Federal Regulations 800.2(d)(3), which requires federal agencies to assess the effects of federal undertakings on historic properties.

During the scoping period, BOEM received a total of 198 comments, 187 of which were unique. BOEM reviewed and considered all scoping comments in the development of the Draft PEIS. The scoping summary report, included in Appendix B, *Scoping Report*, of this PEIS, summarizes the comments

received and the methods for analyzing them. In addition, all public scoping comments received can be viewed online at <http://www.regulations.gov> by typing “BOEM-2023-0061” in the search field. As detailed in the scoping summary report, the most referenced resource areas or NEPA topics were cumulative impacts; mitigation measures; reasonable alternatives; birds; demographics, employment, and economics; fishes, invertebrates, and essential fish habitat; commercial and for-hire recreational fishing; marine mammals; navigation and vessel traffic; scenic and visual resources; and Tribal values and concerns.

Publication of the Draft PEIS initiates a 90-day public comment period, after which all comments received will be assessed and considered by BOEM in preparation of a Final PEIS.

ES.4 Alternatives

BOEM considered a reasonable range of alternatives during the PEIS development process. The alternatives were identified through coordination with cooperating and participating agencies and Cooperating Tribal Governments and through public comments received during the public scoping period for the PEIS. The Draft PEIS evaluates the No Action Alternative and two action alternatives (Alternatives A, B, and C, further detailed below).

Chapter 2, Section 2.2, *Alternatives Considered but Not Analyzed in Detail*, describes the alternatives that were considered but not carried forward in this Draft PEIS and the rationale for not completing a co-equal analysis of these alternatives.

ES.4.1 Alternative A – No Action Alternative

Alternative A, the No Action Alternative, assumes that no wind energy development would occur in any of the five Humboldt and Morro Bay leased areas. However, Alternative A assumes all other ongoing or other reasonably foreseeable planned activities described in Appendix C, *Planned Activities Scenario*, would continue. In the absence of development in the five Humboldt and Morro Bay leased areas, other reasonably foreseeable planned impact-producing activities would be realized, which would cause changes to existing baseline conditions. Current resource conditions, trends, and impacts from ongoing activities provide context for the analyses of Alternatives B and C, as well as a baseline for the evaluation of cumulative impacts.

As of the publication of this document, several prospective Wind Energy Areas (WEAs) are being studied offshore California and Oregon, but none have been leased; therefore, the WEAs are considered too speculative to include as part of the baseline analysis of this PEIS. In April 2024, BOEM published a draft environmental assessment associated with the prospective leasing of two Oregon WEAs (off Brookings and Coos Bay). The environmental assessment focuses on potential effects of site characterization and site assessment activities expected to take place after BOEM’s possible future issuance of commercial wind energy leases. Such activities are intended to allow lessees to gather sufficient information to inform future submittal of COPs. Therefore, for the purposes of this PEIS, site characterization and site assessment activities of the two Oregon WEAs are considered reasonably foreseeable. Please refer to

the draft environmental assessment for a discussion of associated environmental effects at <https://www.boem.gov/renewable-energy/state-activities/commercial-wind-lease-issuance-pacific-outer-continental-shelf>.

ES.4.2 Alternative B – Development with No Mitigation Measures

Alternative B considers future offshore wind development in the Humboldt and Morro Bay leased areas without the application of any mitigation measures. Non-routine activities and events during construction, operations and maintenance, and decommissioning are also considered as part of the analysis for Alternative B.

Analysis of Alternative B considers two scenarios intended to provide minimum/maximum impact levels: (1) one representative project in a Humboldt leased area and one in a Morro Bay leased area), and (2) a total of five representative projects (two in Humboldt and three in Morro Bay, corresponding to one project in each of the five leased areas). The analysis of both scenarios considers potential impacts of such development on the environment. Alternative B also provides analysis for tiering at the COP-specific NEPA stage, including context that can be used in the analyses and against which proposed actions at the COP-specific stage may be compared.

As of 2024, all existing offshore wind turbines in the United States are secured directly to the Atlantic Ocean seafloor; there are no offshore wind turbines on the Pacific OCS. There are no floating offshore wind turbines off any U.S. coast and only limited operational floating offshore wind globally. Offshore California, ocean depths of more than 1,640 feet (500 meters) make fixed-bottom foundations infeasible. Wind turbine generators (WTGs) and offshore substations (OSSs) in the subject lease areas would, therefore, require floating substructures. While floating offshore wind technology continues to evolve, understanding of the technical and design requirements is at a point where reasonable assumptions can be made for the analysis within this PEIS.

The basis for Alternative B is a Representative Project Design Envelope (RPDE) developed in conjunction with the National Renewable Energy Laboratory and input from the five California lessees. The RPDE is a range of technical parameters that describe a representative offshore wind energy project that could occur within any of the Humboldt and Morro Bay leased areas. Table ES-1 outlines the parameters of the RPDE that are being used for the analysis of one representative project. The RPDE is not meant to be prescriptive, nor is it representative of any single lessee's project. Instead, the RPDE is a hypothetical, informed representative project to help guide environmental analysis in this PEIS and streamline subsequent COP-specific NEPA analysis.

Because the analysis in this Draft PEIS is being prepared before the Humboldt Bay or Morro Bay COPs have been submitted by lessees, actual locations of landfall and onshore facilities are unknown at this time. Therefore, this Draft PEIS describes the types of impacts anticipated or assumed from construction and operation of onshore components based on reasonable assumptions of corridors and buffers for export cable routes and landfall locations. Onshore elements are included in BOEM's analysis in the

Draft PEIS to support the evaluation of a complete project and for future tiering; however, BOEM’s authority under the Outer Continental Shelf Lands Act extends only to the activities on the OCS.¹

The same types of design parameters described for one project each in Humboldt and Morro Bay would also apply to development in all five Humboldt and Morro Bay leased areas, except that the number and length of each parameter would be scaled for five projects.

Table ES-1. Assumed RPDE parameters

Element	Project Design Element	Typical Range
Plant layout	Plant capacity	750–3,000 MW
	Number of WTGs	30–200
	Turbine spacing	0.5–1.6 nautical miles (920 meters–3 kilometers)
	Watch circle radius	Up to 1,150 feet (350 meters)
	Capacity density	3–9 MW/km ²
WTGs	Turbine rating	15–25 MW
	Turbine rotor diameter	750–1,000 feet (230–305 meters)
	Total turbine height	850–1,100 feet (260–335 meters)
	Turbine installation method	A floating substructure, with turbine pre-installed at port or sheltered location, towed out to site by a towing vessel group or floating substructure towed to site, with turbine installed at site by a wind turbine installation vessel or heavy-lift vessel.
	WTG substructure type	Semisubmersible, barge, or tension-leg platform (TLP); conventional spar may not be feasible but other ballast-stabilized designs may be considered.
Moorings	Mooring line configuration	Taut, semi-taut, or tension leg; catenary moorings are possible but less likely.
	Mooring arrangements	3–12 mooring lines per turbine or substation, shared-anchor arrangements are possible, shared-mooring arrangements are possible but less likely.
	Mooring line materials	Synthetic fiber rope (polyester, high-modulus polyethylene (HMPE), nylon), steel chain, steel wire rope, steel or fiber tendons (e.g., carbon fiber). May also include buoyancy modules, clump weights, load reduction devices, and other accessories.
	Anchor type	Depending on soil type and mooring configuration: suction caisson, helical anchor, plate anchor (vertical load anchor or suction-embedded plate anchor), dynamically embedded (torpedo) anchor, driven pile, drilled pile, micropile, gravity anchor; drag embedment anchor is possible but less likely.
	Anchor materials	Steel or concrete; drilled piles and micropiles may use grout
	Seabed footprint radius	160–8,500 feet (50–2,600 meters)
	Seabed contact area	0.05–75 acres (200–300,000 square meters)

¹ For this PEIS, *offshore* means on the OCS. *Nearshore* means state waters (up to 3 nm from shore).

Element	Project Design Element	Typical Range
OSSs	Number and type of OSSs	1–6
	OSS substructure type	Floating: semisubmersible, barge, TLP, spar Emerging technology: subsea substation ²
	OSS seabed footprint radius	160–8,500 feet (50–2,600 meters)
	OSS seabed contact area	0.05–75 acres (200–300,000 square meters)
Array cables	Total array cable length	0.5–2.7 nm (1–5 kilometers) average per WTG; individual cables may be up to 10.8–16.2 nm (20–30 kilometers) in some circumstances.
	Array cable diameter	5.5–9.8 inches (14–25 centimeters)
	Target array cable depth	At least 200 feet (60 meters) below water surface.
	Array cable configurations	Cables and mooring lines may be suspended in the water column, laid on the seabed, or buried; suspended configurations can include, but are not limited to, lazy wave, catenary, steep wave, or suspended U.
	Array cable installation methods	Cable lay vessel, possibly assisted by a remotely operated vessel (ROV) and/or construction support vessel.
	Cable protection types	Dynamic cables: accessories for cable protection may include bend stiffeners, dynamic bend restrictors, buoyancy modules, sleeves, seabed tethers, anchors or any other combination of protection means as determined by the site-specific design Seabed: protection could include burial, rock dumping, or mattresses.
Export cables	Number of export cables	2–8
	Total export cable route length	19–270 nautical miles (35–400 kilometers) per cable (offshore)
	Export cable voltage	Up to 525 kV (DC) or 420 kV (AC)
	Export cable diameter	4.7–14 inches (12–36 centimeters)
	Export cable configuration	Dynamic cable between a floating substation and the seabed, with a transition joint to static cable for remaining length; static cable between a subsea substation and cable landfall.
	Export cable seabed disturbance (width)	Up to 43 feet (13 meters), or cable diameter if not buried.
	Export cable spacing	2–3 times the water depth on at least one side of a cable to provide repair access; minimum 160–660 feet (50–200 meters) between adjacent cables.
	Target export cable burial depth	3–10 feet (1–3 meters); burial may not be required along full cable route depending on seabed conditions, vessel traffic, and other factors considered in a cable burial risk assessment.

² As subsea substations are considered an emerging technology, they are not discussed further in this PEIS because of the uncertainty around potential impacts.

Element	Project Design Element	Typical Range
	Export cable installation methods	Trenchless: horizontal direct drilling (HDD), direct pipe, micro-tunnel, jack and bore. Trenched: open cut trench, direct burial. Tools and vessels: cable lay vessel, ROV, cable plow, hydro plow, jetting sled, vertical injector, tracked trencher.
	Cable protection types	Dynamic cables: accessories for cable protection may include bend stiffeners, dynamic bend restrictors, buoyancy modules, sleeves, seabed tethers, anchors, or any other combination of protection means as determined by the site-specific design. Seabed: burial, rock, concrete mattress (at crossings).
Onshore facilities	Transmission points of interconnection	Various potential points of interconnection may be considered.
	Ports	Potential staging and integration ports: Port of Humboldt, Port of Long Beach, Port of Los Angeles. Additional ports in California that could support component storage, laydown, fabrication, or operations and maintenance: the Ports of Stockton, Benicia, Richmond, Oakland, San Francisco, Redwood City, San Luis, Hueneme, and San Diego; the Crescent City Harbor District; the cities of Alameda, Pittsburg, and Morro Bay; Pillar Point Harbor; the Diablo Canyon Power Plant; Ellwood Pier. Ports outside California may also support component manufacturing, storage, or installation.

ES.4.3 Alternative C (Proposed Action) – Adoption of Mitigation Measures

Alternative C, the Proposed Action, is BOEM’s prospective adoption of a suite of program-level mitigation measures that could be, but may not necessarily be, applied to activities associated with Alternative B to reduce or avoid potential impacts. This alternative analyzes the change in impacts from those discussed under Alternative B. Appendix E, *Mitigation*, identifies the mitigation measures that make up the Proposed Action.

Other than the adoption of mitigation measures, all design parameters for Alternative C would be the same as described under Alternative B for project components and activities undertaken for construction, operations and maintenance, and decommissioning. Similar to Alternative B, Alternative C examines two build-out scenarios: (1) one representative project each in Humboldt and Morro Bay and (2) five representative projects (two in Humboldt and three in Morro Bay).

ES.5 Environmental Impacts

This Draft PEIS analyzes the No Action Alternative first to consider existing baseline conditions. The existing condition of resources as influenced by past and ongoing activities and trends represents the existing baseline condition for impact analysis. This document analyzes the additive effects of future planned activities described in Appendix C. The impact analysis of the action alternatives (Alternatives B and C) considers the effects of one representative project each in Humboldt and Morro Bay (i.e., two

total projects), as well as five representative projects when added to the existing baseline condition of each resource. Cumulative impacts for the action alternatives are then developed by considering the additive effects of reasonably foreseeable planned activities.

Table ES-2 summarizes the impacts of each alternative; refer to the Chapter 3 resource sections for additional analysis supporting these impact determinations.

Table ES-2. Summary and comparison of impacts among alternatives

Resources	Alternative A – No Action	Alternative B – Development with No Mitigation Measures	Alternative C (Proposed Action) – Adoption of Mitigation Measures
3.2.1 Air Quality and Greenhouse Gas Emissions	Existing environmental trends and ongoing activities would continue to affect air quality. Ongoing activities would continue to have regional air quality impacts primarily through air pollutant emissions, accidental releases, and climate change. Ongoing activities would likely result in impacts on air quality because of air pollutant emissions and GHGs.	Alternative B could have a net decrease in overall emissions for the region compared to emissions from conventional fossil-fuel power plants. Alternative B would result in air quality impacts during construction, maintenance, and decommissioning, but there would be a beneficial impact on air quality in the surrounding region to the extent that the wind energy produced would displace energy produced by fossil-fuel power plants.	Alternative C would result in the same impacts and beneficial impacts as Alternative B; however, emissions (related to construction) could be reduced through mitigation measures.
3.2.2 Water Quality	Water quality would continue to follow current regional trends and respond to ongoing environmental and commercial activities, including climate change. Ongoing activities would likely result in temporary impacts primarily through accidental releases and sediment suspension related to vessel traffic, port utilization, presence of structures, discharges/intakes, and land disturbance.	Alternative B would likely have impacts across several IPFs, including accidental releases, invasive species, and anchoring.	Alternative C would result in the same impacts as Alternative B; mitigation measures would reduce impacts of anchoring and sediment disturbance.
3.3.1 Bats	Bats would continue to be affected by existing environmental trends and ongoing activities. Ongoing activities would have temporary, long-term, and permanent impacts (disturbance, displacement, injury, and mortality) on bats primarily through noise, lighting, presence of structures, traffic, and climate change.	Alternative B would likely have impacts on bats. The most acute risk would be from operation of the offshore WTGs, which could lead to long-term impacts (injury and/or mortality). Impacts are anticipated to be more likely during spring and fall migration when higher numbers of bats have been documented offshore. However, there is currently insufficient data on bat presence, abundance, and behavior in the OCS to quantify these impacts.	Alternative C would result in the same impacts as Alternative B; however, mitigation measures under Alternative C may reduce impacts on bats in the offshore environment, though the extent of any reduction would depend on project-level detail not available at the programmatic stage.

Resources	Alternative A – No Action	Alternative B – Development with No Mitigation Measures	Alternative C (Proposed Action) – Adoption of Mitigation Measures
3.3.2 Benthic Resources	Ongoing activities such as repetitive channel deepening, dredging, trawling for commercial fisheries, and the ongoing installation and maintenance of submarine cables would continue to have short- and long-term impacts. Impacts on species would be unavoidable but are not expected to result in population-level effects, especially if sensitive habitats are avoided and disturbances are temporally and spatially distributed.	Alternative B would likely have impacts on benthic resources. Beneficial impacts are expected for species that are able to colonize the newly added hard surfaces and those attracted by new food sources or shelter.	Alternative C would result in the same impacts as Alternative B; however, mitigation measures may benefit benthic communities, especially sensitive species. Beneficial impacts are also expected for species that would colonize the newly added hard surfaces and benefit from the fish aggregation device. This may, in turn, benefit species attracted to these areas for food sources and shelter, increasing the reef effect.
3.3.3 Birds	Birds would continue to be affected by existing environmental trends and ongoing activities. Ongoing activities would continue to have temporary and permanent impacts (disturbance, displacement, injury, mortality, habitat degradation, habitat alteration) primarily through construction and climate change.	Alternative B would have impacts on birds depending on the offshore lighting scheme, the duration and timing of construction activities, and affected species. Operation of the offshore WTGs would pose the largest risk and could lead to long-term impacts (mortality and displacement). Alternative B could also result in increased foraging opportunities for some marine birds.	Alternative C would result in the same impacts as Alternative B; however, mitigation measures could reduce potential impacts on birds. Alternative C could also result in increased foraging opportunities for some marine birds.
3.3.4 Coastal Habitat, Fauna, and Wetlands	Ongoing activities would continue to have temporary, long-term, and permanent impacts (disturbance, displacement, injury, mortality, and habitat conversion) on coastal habitat and fauna. Land disturbance from onshore development would cause temporary and permanent loss of wetlands. Permanent wetland impacts would likely occur, requiring compensatory mitigation because climate change is predicted to affect coastal habitat and fauna.	Alternative B would have impacts on coastal habitat, fauna, and wetlands, depending on the amount and quality of coastal habitat altered or removed and the area/type of wetlands affected (if any) and duration of impact. Any identified wetland impacts would be subject to mitigation requirements set forth in the Clean Water Act Section 404(b)(1) guidelines of avoidance, minimization, and compensatory mitigation, likely reducing such impacts.	Alternative C would result in the same impacts as Alternative B; however, mitigation measures could reduce some impacts associated with cable installation and maintenance, EMFs and cable heat, and noise. Impacts on wetlands would remain similar and remain subject to Clean Water Act requirements/associated minimization and mitigation.

Resources	Alternative A – No Action	Alternative B – Development with No Mitigation Measures	Alternative C (Proposed Action) – Adoption of Mitigation Measures
3.3.5 Fishes, Invertebrates, and Essential Fish Habitat	Ongoing activities would continue to have temporary and permanent impacts on fishes, invertebrates, and EFH primarily through climate change, commercial fishing activities, dredging, anthropogenic noise, new cable installation, invasive species, port improvements, and the presence of structures.	Alternative B would result in impacts, depending on the IPF and which leased areas would be developed. Alternative B would result in the potential loss of HAPCs in leased areas. For both project scenarios, beneficial impacts are expected for species that can colonize newly added hard surfaces.	Alternative C would result in the same impacts as Alternative B; although mitigation measures would reduce impacts. For both project scenarios, beneficial impacts are also expected for species that can colonize newly added hard surfaces.
3.3.6 Marine Mammals	Ongoing activities such as climate change would continue to affect marine mammal foraging and reproduction through changes to the distribution and abundance of marine mammal prey.	Alternative B would have impacts on mysticetes, odontocetes, pinnipeds, and fissionipeds, with potentially beneficial impacts on odontocetes and pinnipeds though such benefits may be offset by increased entanglement risk with WTG structures/moorings.	Alternative C would result in the same impacts as Alternative B; however, mitigation measures would reduce impacts for mysticetes, odontocetes, pinnipeds, and fissionipeds. Potentially beneficial impacts would occur for odontocetes and pinnipeds.
3.3.7 Sea Turtles	Sea turtles would continue to be affected by existing environmental trends and ongoing activities. In addition to climate change, BOEM expects a range of sea turtle impacts (disturbance, displacement, injury, mortality, and reduced foraging success).	Alternative B would result in impacts on sea turtles. Beneficial impacts are expected from the presence of structures primarily due to an increase in foraging opportunity due to the reef effect. These beneficial effects could be offset by increased risk of entanglement due to derelict fishing gear on the structures.	Alternative C would result in the same impacts as Alternative B; however, mitigation measures would reduce some impacts. Impacts under Alternative C would not affect the continued viability of any sea turtle populations. Beneficial impacts are expected from the presence of structures/reef effect.
3.4.1 Commercial Fisheries and For-Hire Recreational Fishing	Ongoing activities would continue to have temporary to long-term impacts on commercial fisheries and for-hire recreational fishing. The extent of impacts would vary by fishery due to differing target species, gear type, and location.	Alternative B would result in impacts on commercial fisheries and for-hire recreational fishing overall. Beneficial impacts on for-hire recreational fishing may also occur based on the potential bolstering of for-hire recreational fishing opportunities due to the reef effect. Such benefits would depend on the ability of for-hire vessels to safely fish around structures and would be limited to for-hire vessels capable of making longer trips that	Alternative C would result in the same impacts as Alternative B; however, mitigation measures would reduce impacts although impacts on commercial fisheries and for-hire recreational fishing would be similar, overall. Under Alternative C, beneficial impacts on for-hire recreational fishing may also occur based on the potential bolstering of for-hire recreational fishing opportunities due to the reef effect.

Resources	Alternative A – No Action	Alternative B – Development with No Mitigation Measures	Alternative C (Proposed Action) – Adoption of Mitigation Measures
		would be required to reach the leased areas.	
3.4.2 Cultural Resources	Cultural resources would continue to be affected by existing environmental trends and ongoing activities. Ongoing activities would continue to have temporary, long-term, and permanent impacts (marine, terrestrial, and visual) on cultural resources in the Affected Environment through seabed, terrestrial, and visual disturbance.	Alternative B would likely result in impacts on cultural resources because the increased amount of development increases the likelihood that impacts would be physically damaging or cause permanent setting changes, and that such impacts would occur on a greater number of cultural resources.	Alternative C would result in the same impacts as Alternative B. Adoption of mitigation measures could enable a more consistent process, allowing the future COP-specific NEPA and NHPA reviews, consultations, and plans to be focused on project-specific impacts. However, at this programmatic stage, more conclusive determinations of the effectiveness of mitigation are not possible; therefore, their impact on cultural resources have yet to be determined.
3.4.3 Demographics, Employment, and Economics	Tourism, recreation, and ocean-based industries such as marine transportation would continue to be important components of the regional economies. Ongoing activities would continue to have impacts on demographics, employment, and economics in the Affected Environment. Beneficial impacts on demographics, employment, and economics would occur from the continued operation of existing sectors in the ocean economy.	Alternative B would result in impacts on demographics, employment, and economics through job creation and increased business revenue. Effects could be offset by beneficial effects on regional economies from increased economic activity and employment associated with the development of offshore wind energy in the regions of greatest port and manufacturing activity.	Under Alternative C, impacts on demographics, employment, and economics would likely remain the same as Alternative B, i.e., impacts through job creation and increased business revenue.
3.4.4 Environmental Justice	Numerous ongoing activities, both on- and offshore, would continue to affect environmental justice communities in the Affected Environment. Additional impacts would be driven by the effects of climate change and the ability for coastal communities to readily adapt to population	Alternative B would have impacts on environmental justice communities. Alternative B may also result in beneficial impacts from port expansion/use resulting from positive contributions to employment and revenue from offshore wind energy development activities. In addition, the potential long-term health benefits	Under Alternative C, impacts on environmental justice communities would be slightly reduced compared to Alternative B as a result of mitigation, including the measure intended to lessen impacts on commercial and for-hire recreational fishing.

Resources	Alternative A – No Action	Alternative B – Development with No Mitigation Measures	Alternative C (Proposed Action) – Adoption of Mitigation Measures
	migration (housing disruptions), sea level rise, and storm surge threats.	associated with displacement of energy produced by fossil-fueled power plants would have beneficial health effects to the extent that current health issues are related to fossil-fuel power plants.	
3.4.5 Tribal Values and Concerns Analysis	Ongoing activities would continue to have temporary, long-term, and permanent impacts on resources of Tribal value and concern in the prospective Affected Environment through seabed, terrestrial, and visual disturbances and intrusions.	Alternative B would result in impacts with the degree or extent of impacts anticipated to be greater in proportion to the level of development. Greater economic activity in ports could have beneficial impacts on Tribal communities and, in turn, resources of Tribal value and concern. Impacts of one or five representative projects would be due to the extent of onshore and offshore development that could introduce physical and visual impacts on resources of Tribal value and concern.	Under Alternative C, adherence to mitigation measures could lessen impacts on resources of Tribal value and concern, but given numerous uncertainties about the location, nature, and extent of such resources, impacts would, at this programmatic stage, remain the same as Alternative B— impacts with the potential for beneficial economic impacts for either one or five representative projects.
3.4.6 Land Use and Coastal Infrastructure	Land use and coastal infrastructure would continue to be affected by existing environmental trends and ongoing activities, as well as climate change.	Alternative B would likely have impacts because of increased onshore land disturbance and infrastructure, as well as beneficial impacts from port utilization.	Alternative C would result in the same impacts and beneficial impacts as Alternative B. The mitigation measure that would be implemented under Alternative C may slightly reduce overall impacts on land use by minimizing temporary construction impacts.
3.4.7 Navigation and Vessel Traffic	Navigation and vessel traffic would continue to be affected by existing socioeconomic trends and ongoing activities. Under the No Action Alternative, ongoing activities would continue to have short- and long-term impacts on navigation and vessel traffic, primarily through the IPFs of anchoring, cable installation and maintenance, port utilization, and vessel traffic.	Alternative B would result in impacts. Needed port upgrades for offshore wind development would contribute to baseline traffic levels. Impacts on vessels (not associated with wind energy) include changes in navigation routes, delays in ports, degraded radar signals, and increased difficulty of offshore search and rescue or surveillance missions in each of the leased areas, all of which would	Alternative C would result in the same impacts as Alternative B, including anchoring and the remaining IPFs, as impacts cannot be fully avoided. The mitigation measures that would be implemented under Alternative C could reduce impacts associated with cable installation, presence of structures, and vessel traffic depending on project-level details.

Resources	Alternative A – No Action	Alternative B – Development with No Mitigation Measures	Alternative C (Proposed Action) – Adoption of Mitigation Measures
		<p>increase navigational safety risks. Commercial deep-draft vessels would choose to avoid the leased areas altogether, leading to potential funneling of vessel traffic along leased-area borders. In addition, increased potential for marine accidents, which may result in injury, loss of life, and property damage, could produce disruptions for ocean users.</p>	
<p>3.4.8 Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research and Surveys)</p>	<p>Other uses would continue to be affected by existing environmental trends and activities. Existing operations nearshore and on the OCS could increase vessel traffic and navigational complexity of the region.</p>	<p>Alternative B would result in impacts on other uses. The construction of WTGs would result in increased navigational complexity and increased allision risk. The presence of WTGs in the line of sight could interfere with radar systems. The seafloor footprint of WTG anchors and the presence of offshore export cables would affect existing cables and pipelines. Scientific research and surveys would be affected, particularly for NOAA surveys supporting commercial fisheries and protected-species research programs.</p>	<p>Alternative C would result in the same impacts as Alternative B. The mitigation measures that would be implemented under Alternative C would reduce impacts on radar systems relative to Alternative B.</p>
<p>3.4.9 Recreation and Tourism</p>	<p>Under the No Action Alternative, recreation and tourism would continue to be affected by existing environmental trends and ongoing activities. Under Alternative A, impacts of ongoing activities would continue to have effects on recreation and tourism in the Affected Environment. The extent of impacts on recreational fisheries would vary by fishery due to different target species, gear type, and location of activity. These effects would primarily stem</p>	<p>Alternative B would have impacts due to increased anchoring, cable installation and maintenance, and presence of structures.</p>	<p>Alternative C would result in the same impacts as Alternative B. Mitigation measures could reduce impacts on recreation and recreational fishing by ensuring environmental cleanliness and navigational safety, ensuring minimal habitat disruption, and minimizing nighttime visual disturbances.</p>

Resources	Alternative A – No Action	Alternative B – Development with No Mitigation Measures	Alternative C (Proposed Action) – Adoption of Mitigation Measures
	from climate change, with fisheries-management agencies expected to adjust to shifting distributions and other climate-related factors.		
3.4.10 Scenic and Visual Resources	Under the No Action Alternative, regional trends and activities would continue, and scenic and visual resources would continue to be affected by natural and human-caused IPFs. The coastal landscape’s character would change in the short and long terms through natural processes and ongoing activities that would continue to shape onshore features, character, and viewer experience.	Alternative B would result in impacts, due to view distances; minor to moderate FOVs; strong, moderate, and weak visual contrasts; clear-day conditions; and nighttime lighting. Due to distance, extensive FOVs, strong contrasts, large scale of change, and level of prominence, as well as heretofore undeveloped ocean views, the representative projects would affect the open ocean character unit and viewer boating and cruise ship experiences.	Alternative C would result in the same impacts as Alternative B. Mitigation has potential to avoid or reduce these impacts by grouping transmission infrastructure and developing and adhering to a visual monitoring plan.

GHGs = greenhouse gases; IPFs = impact-producing factors; EMFs = electromagnetic fields; EFH = essential fish habitat; HAPCs = Habitat Areas of Particular Concern; NHPA = National Historic Preservation Act; FOVs = fields of view