United States Government Accountability Office

Report to Congressional Requesters

April 2025

OFFSHORE WIND ENERGY

Actions Needed to Address Gaps in Interior's Oversight of Development

GAO-25-106998

GAO Highlights

Highlights of GAO-25-106998, a report to congressional requesters

April 2025

OFFSHORE WIND ENERGY

Actions Needed to Address Gaps in Interior's Oversight of Development

Why GAO Did This Study

Offshore wind energy development in the U.S. is expanding. There are active wind farms and construction in the Atlantic and planned development off the Pacific coast and in the Gulf of Mexico. BOEM and BSEE are responsible for permitting and oversight of offshore wind projects. Numerous other federal agencies provide input throughout the process. As of January 2025, BOEM had granted 39 offshore wind leases to commercial developers, but on January 20, 2025, the President issued a memorandum that, among other things, prohibits agencies from new leasing, permits, or approvals for offshore wind projects pending a review of federal wind leasing and permitting practices. As the pace of offshore wind development has accelerated, state and local communities, Tribes, and non-government entities could experience the potential effects of offshore wind development.

GAO was asked to review offshore wind development in federal waters. This report examines (1) what is known about the potential impacts of offshore wind energy development, and (2) what mechanisms BOEM, in coordination with other agencies, has in place to oversee offshore wind energy development and to what extent they address potential impacts.

To examine potential impacts, GAO contracted with the National Academies to identify a panel of 23 experts to include diverse participant backgrounds and cover a range of potential impact categories. These include impacts to emissions, marine life and ecosystems, and maritime navigation and safety. Information

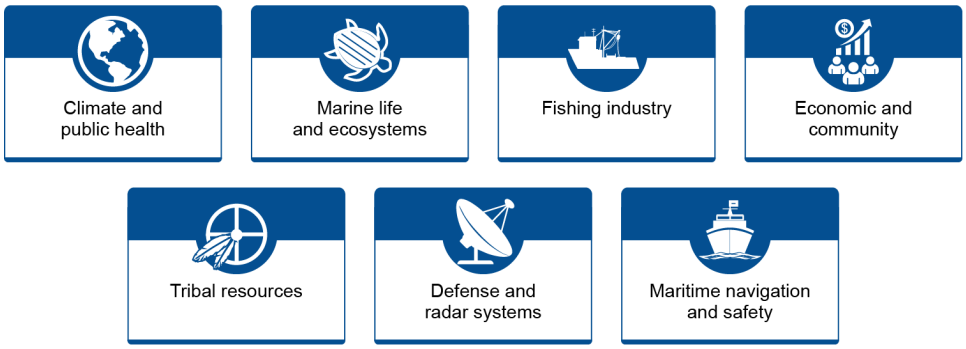
For more information, contact Frank Rusco at ruscof@gao.gov.

What GAO Found

Offshore wind energy development has various potential positive and negative impacts in several areas. These include climate and public health, marine life and ecosystems, fishing industry, economic and community, tribal resources, defense and radar systems, and maritime navigation and safety impacts. However, because it is early in U.S. deployment of commercial offshore wind projects, the extent of some impacts is unknown. Moreover, uncertainty exists about long-term and cumulative effects, and the extent of impacts will vary depending on the location, size, and type of offshore wind infrastructure. Because of the lack of definitive research related to some impacts, GAO convened a panel of 23 experts with assistance from the National Academies of Sciences, Engineering, and Medicine (National Academies) to identify and evaluate what is known about the potential impacts of offshore wind development.

Among such impacts, development and operation of offshore wind energy facilities could affect marine life and ecosystems, including through acoustic disturbance and changes to marine habitats. Wind development could bring jobs and investment to communities. At the same time, it could disrupt commercial fishing to varying degrees. Turbines could also affect radar system performance, alter search and rescue methods, and alter historic and cultural landscapes.

Areas of Potential Offshore Wind Energy Impacts



Source: GAO (analysis and icons). | GAO-25-106998

The Department of the Interior's Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE) oversee offshore wind energy development. This is conducted through a multi-year permitting process that includes coordination with other agencies and stakeholders to identify and mitigate potential impacts.

However, Tribes have raised concerns regarding BOEM's consultation with them. During initial planning of wind energy areas and when establishing wind lease areas, BOEM has taken steps to incorporate tribal input but has not consistently engaged in meaningful consultation with Tribes. BOEM documents indicate that it received tribal officials' concerns but do not consistently demonstrate efforts to consider or address these concerns. BOEM officials acknowledged room for improvement and released a strategy for tribal engagement in December 2024. However, its implementation plan remains unclear. Clearly demonstrating and

obtained through expert interviews formed the basis of GAO's findings on the potential impacts of offshore wind energy development.

GAO reviewed agency documentation related to federal management of potential offshore wind development impacts from lead agencies BOEM and BSEE, as well as coordinating agencies. These included project documents, memorandums of understanding between BOEM and federal partners, and studies. In addition, GAO reviewed studies and published research findings identified through a literature search, as well as prior GAO work, including a July 2024 Technology Assessment on approaches to address environmental effects of wind energy (GAO-24-106687).

To gather perspectives on potential impacts and federal oversight, GAO interviewed representatives from 22 Tribes and tribal organizations and multiple stakeholders from states, research institutes, fisheries, and industry, among others. GAO also interviewed officials from lead and coordinating agencies about potential impacts and their role in overseeing the offshore wind development and leasing process. To further examine mitigation of offshore wind impacts and discuss BOEM and BSEE oversight, GAO conducted two site visits to offshore projects with ongoing construction and operations activities.

What GAO Recommends

GAO recommends that Congress consider amending language in legislation to address BOEM's limitations to providing adequate support for tribal capacity-building.

GAO is also making five recommendations to BOEM and BSEE, including that they address gaps in oversight related to (1) tribal consultation and incorporation of Indigenous knowledge; (2) consideration of input from the fishing industry; (3) guidance for communication and engagement plans; and (4) resources for oversight in the North Atlantic region. Interior agreed with all five recommendations.

routinely reporting on its progress would help ensure that BOEM is adequately considering tribal concerns and building trust with Tribes. Also, nearly all tribal officials that GAO interviewed said that they do not have sufficient capacity to adequately review documents or meaningfully consult with government officials and developers. Agency officials stated that consultation has been hindered by limitations in BOEM's statutory authority to provide support for tribal capacity building. Without a change to BOEM's authority, tribal input and Indigenous knowledge may not be sufficiently incorporated into decisions.

Coastal Virginia Offshore Wind Pilot Project

Source: Bureau of Ocean Energy Management. | GAO-25-106998

BOEM has taken steps to inform fisheries stakeholders about its process and efforts to incorporate their input when establishing a lease area for offshore wind projects. However, stakeholders remain concerned that BOEM has not adequately considered or addressed the concerns of the commercial fishing industry and fisheries management councils at that stage of the permitting process. BOEM considers competing uses of the areas under consideration for development, including commercial fishing.

While BOEM has met with fishing industry representatives during the process, fishery stakeholders said they viewed BOEM's responses to input as unclear or insufficient. Moreover, it is not clear how BOEM ensures that these stakeholders are consistently included in the process and informed of BOEM's efforts to incorporate input from the industry when establishing lease areas. As a result, development of offshore wind energy could proceed without BOEM showing how it fully considers impacts to fisheries and how it will ensure developers address impacts to the fishing industry.

In addition, opportunities exist for BOEM and BSEE to improve enforcement of lessees' community engagement. Lessees are to create community communication and engagement plans, but BOEM and BSEE have not established guidance for these plans. BOEM and BSEE also do not have a plan to monitor implementation and have not clarified their roles and responsibilities for monitoring implementation and enforcement. Without doing so, the agencies cannot ensure that they are fulfilling their oversight responsibilities or that lessees are effectively engaging with—and mitigating impacts to—affected communities.

Finally, BOEM and BSEE have not taken steps to ensure that they have the resources in place for effective oversight of offshore wind development. Specifically, neither agency has a physical presence in the North Atlantic region where offshore wind construction is underway. BOEM and BSEE officials stated that they are building capacity to oversee development. However, neither agency has taken the necessary steps to establish a physical office for that region, as they have done in the Pacific and the area formerly known as the Gulf of Mexico. Doing so will help ensure that BOEM and BSEE have the resources in place to oversee development in the region and effectively address potential impacts, engage with stakeholders, and oversee implementation of lease requirements.

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Abbreviations

BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
COP	construction and operations plan
DOD	Department of Defense
DOE	Department of Energy
EIS	environmental impact statement
EPA	Environmental Protection Agency
NEPA	National Environmental Policy Act of 1969
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	NOAA's National Marine Fisheries Service
SEER	U.S. Offshore Wind Synthesis of Environmental Effects Research
UME	unusual mortality event

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
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April 10, 2025

Congressional Requesters

As the U.S. seeks to develop more renewable sources of energy, offshore wind energy development in the U.S. Outer Continental Shelf has expanded, including active wind farms and construction in the Atlantic and planned development off the Pacific coast and in the area formerly known as the Gulf of Mexico.[1] While the ability to harness offshore wind energy in the U.S. is in the early stages compared with European and some Asian countries, the federal government and 13 states have set goals to deploy offshore wind energy.[2] Specifically, as of May 2024, eight states had set procurement mandates for offshore wind capacity by 2040, and five additional states had set formal planning targets.[3] Legislation advancing renewable energy continues to be a significant trend, with many states working to meet specific goals for renewable energy or emissions reductions.[4] Greenhouse gas emissions contribute to climate change, which numerous studies have shown poses environmental and economic risks.

[1]In January 2025, the President issued Executive Order 14172 directing the Secretary of the Interior to take all appropriate actions to rename as the ‘‘Gulf of America’’ the U.S. Continental Shelf area bounded on the northeast, north, and northwest by the States of Texas, Louisiana, Mississippi, Alabama and Florida and extending to the seaward boundary with Mexico and Cuba in the area formerly named as the Gulf of Mexico. E.O. 14172 of Jan. 20, 2025, 90 Fed. Reg. 8629 (Jan. 31, 2025).

[2]National Renewable Energy Laboratory, *Offshore Wind Market Report: 2024 Edition* (Washington, D.C.: August 2024). In June 2022, the White House announced a joint effort of the federal government and the governors of several East Coast states to meet the goal to deploy 30 gigawatts of offshore wind by 2030. White House, *FACT SHEET: Biden Administration Launches New Federal-State Offshore Wind Partnership to Grow American-Made Clean Energy* (Washington, D.C.: June 23, 2022).

[3]While planning goals do not require agencies to take direct action for offshore wind, procurement mandates are statutory requirements for the state to achieve a predetermined quantity of offshore wind generation on a scheduled timeline. National Renewable Energy Laboratory, *Offshore Wind Market Report: 2024 Edition* (Washington, D.C.: August 2024).

[4]In 2023, many states introduced legislation to address domestic manufacturing and supply chains for offshore wind turbines, according to the National Conference of State Legislatures. “2024 Legislative Energy Trends,” National Conference of State Legislatures, updated March 18, 2023, https://www.ncsl.org/energy/2023-legislative-energy-trends.

The Department of the Interior's Bureau of Ocean Energy Management (BOEM), in coordination with the Bureau of Safety and Environmental Enforcement (BSEE), is the federal entity that oversees offshore wind energy development in federal waters, including the permitting of offshore wind projects.[5] These agencies are to engage other federal agencies, such as the Army Corps of Engineers, National Oceanic and Atmospheric Administration (NOAA), the Advisory Council on Historic Preservation, the United States Coast Guard, the Department of Defense (DOD), U.S. Fish and Wildlife Service, and other federal agencies. In addition, they are to engage with Tribes and stakeholders, such as state and local governments and non-government entities through a complex, multi-year process for offshore wind projects.

As of January 2025, BOEM had granted 39 offshore wind leases to commercial developers on the Outer Continental Shelf. One lease has a fully operational project, four leases have projects under construction, and 11 more leases have projects in various stages of permitting review prior to construction (see table 1).[6]

[5]In January 2025, the President issued a Presidential Memorandum withdrawing from disposition for wind energy leasing all areas within the Offshore Continental Shelf [sic] as defined in section 2 of the Outer Continental Shelf Lands Act, Pub. L. No. 83-212, § 2(a), 67 Stat. 462 (1953) (codified as amended at 43 U.S.C. § 1331(a)). This memorandum also prohibits agencies from issuing permits or other approvals for onshore and offshore wind projects pending a review of federal wind leasing and permitting practices. Presidential Memorandum of Jan. 20, 2025, 90 Fed. Reg. 8363 (Jan. 29, 2025).

[6]At the time of this report's publication, there is ongoing litigation involving challenges to BOEM's approvals of construction and operations for several of the projects, as well as marine mammal incidental harassment authorizations and letters of authorization from NOAA for project development activities. See, e.g., *Cmtee for a Constructive Tomorrow v. U.S. Dept. of the Interior*, No. 24-cv-00774 (D.D.C.); *Preservation Society of Newport Beach v. Haaland*, No. 1:23-cv-03510 (D.D.C.); *Save Long Beach Island v. U.S. Dept. of Commerce*, No. 3:23-cv-1886 (D.N.J.). In presenting the information in this report, we take no position on the disputed facts or disputed legal issues that are before the courts or may be raised in those or future related cases.

Table 1: Operational and Planned Offshore Wind Projects for Leases Awarded by the Bureau of Ocean Energy Management (BOEM), as of January 2025

Project	Location	Projected capacity in megawatts	Status
South Fork Wind	35 miles east of Montauk Point, NY	132	Operation
Vineyard Wind 1	14 miles off the coast of Martha's Vineyard, MA	800	Under construction
Sunrise Wind	30 miles off the coast of Montauk, NY	924-1034	Under construction
Coastal Virginia Offshore Wind[a]	27 miles off the coast of Virginia Beach, VA	2,500-3,000	Under construction
Revolution Wind	15 miles off the coast of RI	704-880	Under construction
New England Wind 1 (Park City Wind)	30 miles south of Barnstable, MA	791	Construction authorized
New England Wind 2 (Commonwealth Wind)	30 miles south of Barnstable, MA	1,080	Construction authorized
Southcoast Wind Energy	20 miles south of Nantucket, MA	2,400	Construction authorized
Atlantic Shores South Project 1	10-20 miles off the coast near Atlantic City, NJ	1,510	Construction authorized
Empire Wind 1 & 2	20 miles off the coast of Long Island, NY	2,076	Construction authorized
Maryland Offshore Wind	12 miles off the coast of Ocean City, MD	2,000	Construction authorized
Vineyard Northeast	29 miles from Nantucket, MA	2,600	Permitting
Vineyard Mid-Atlantic	24 miles off the coast of Fire Island, NY	2,000+	Permitting
Atlantic Shores North	10-20 miles off the coast near Atlantic City, NJ	–	Permitting
Skipjack Wind	15 miles off the coast of DE	966	Permitting
Kitty Hawk North & South[b]	27 miles off the coast of Corolla, NC	–	Permitting

Legend: – = information not available as of January 2025

Source: GAO analysis of industry and BOEM information. | GAO-25-106998

Notes: This table includes offshore wind leases with projects that have submitted construction and operations plans. It does not include offshore wind leases with projects that are currently paused, including Beacon Wind (20 miles south of Nantucket, MA) and Ocean Wind 1 (15 miles southeast of Atlantic City, NJ). In addition to leases in federal waters, there is one operational offshore wind project, Block Island Wind Farm, in Rhode Island state waters. It generates approximately 30 megawatts per year.

[a]The Coastal Virginia Offshore Wind project is distinct from the Coastal Virginia Offshore Wind Pilot, which consists of two turbines and generates 12 megawatts.

[b]Plans were announced in July 2024 to sell Kitty Hawk North, but as of January 2025, there have been no plans released detailing expected power generation or power purchasing agreements.

You asked us to review offshore wind energy development in federal waters. This report examines (1) what is known about the potential impacts of offshore wind energy development and (2) the mechanisms BOEM, in coordination with other agencies, has in place to oversee offshore wind energy development and to what extent they address potential impacts on Tribes and other stakeholders.

To examine both objectives, we reviewed agency documentation related to federal management of potential offshore wind development impacts. We interviewed representatives from a nongeneralizable sample of seven offshore wind developers and industries that may be affected by development, such as maritime shipping, renewable energy development, and undersea transmission cables. In addition, we interviewed a nongeneralizable sample of eight fisheries stakeholders.[7] We also interviewed officials from three state offices, representatives of three scientific research organizations, and four stakeholders from other industries that may be impacted by offshore wind development, such as maritime shipping, renewable energy development, and undersea transmission cables. We also spoke with representatives from 18 Tribes and four tribal organizations from the Atlantic and Pacific coasts. We reviewed agency documentation on tribal consultations and information provided by Tribes about potential offshore wind development impacts and federal consultation practices.[8]

We conducted site visits to the Coastal Virginia Offshore Wind pilot project turbines and offshore construction area and the Vineyard Wind staging area in New Bedford, Massachusetts, to examine offshore wind construction and operations activities. We selected these sites to visit because they have ongoing offshore projects performing construction and operations activities. We also interviewed port authority officials, fishermen, and other stakeholders in New Bedford about offshore wind impacts to port operations and BOEM and BSEE oversight.

[7]For the purposes of this report, “fisheries stakeholders” includes four regional fishery management councils that manage fishery resources in federal waters and four fishing industry representatives on the East and West Coasts.

[8]To characterize Tribes’ views throughout this report, we defined modifiers to quantify the views of the representatives from the 22 Tribes and tribal organizations we interviewed as follows: “nearly all” indicates 19 to 21 Tribes or tribal organizations; “most” indicates 15 to 18; “many” indicates 10 to 14; “several” indicates five to nine; and “some” indicates two to four.

To examine what is known about the potential impacts of offshore wind energy development, we reviewed scientific literature identified through a literature search conducted by a GAO librarian. We contracted with the National Academies of Sciences, Engineering, and Medicine to identify a panel of 23 experts to interview about a range of potential impacts. We worked with the National Academies to identify a panel of experts to include diverse participant backgrounds such as academia, think tanks, advocacy groups, and organizations such as fishing industry and maritime shipping and security groups. The information we obtained through our expert interviews formed the basis of our findings on the potential impacts of offshore wind development. In consultation with our research methodologists, we developed a semi-structured question set we used in each expert interview and conducted content analysis to identify potential impacts and knowledge gaps the experts identified. Not all experts could speak to every impact, and thus we note how many made certain statements throughout the report. In most cases, we relied on expert testimony to describe impacts; however, in some cases, we relied on work we identified through our literature review to illustrate a point.

To examine the mechanisms BOEM, in coordination with other agencies, has in place to oversee offshore wind energy development, we reviewed agency documentation and interviewed agency officials about agencies' roles and responsibilities and their oversight of offshore wind development planning, construction, and operations. Appendix I provides additional details on our scope and methodology.

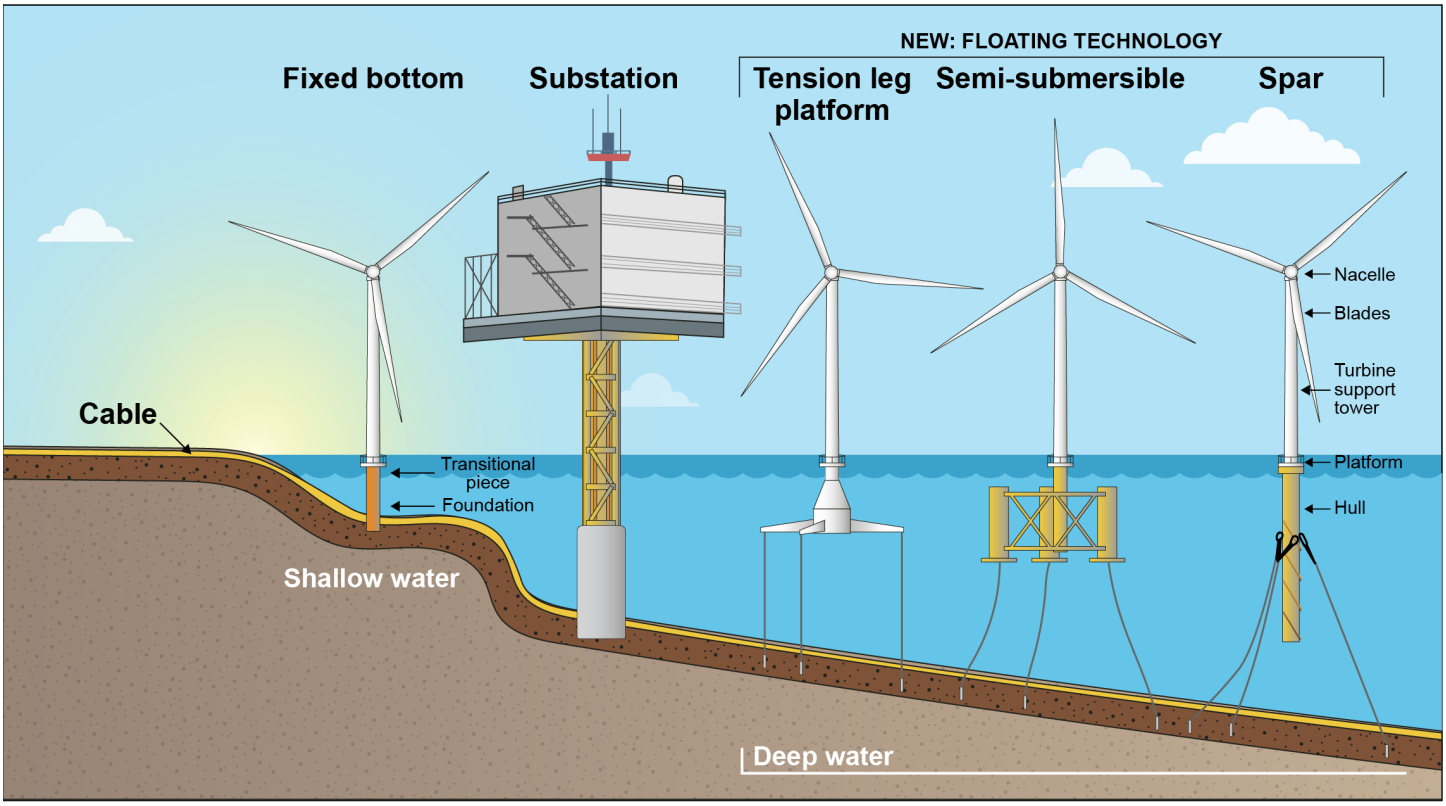
We conducted this performance audit from August 2023 to April 2025, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Wind turbines generate electricity by turning blades around a rotor, spinning a generator to create electricity. Electricity generation depends on wind speed and blade length. Power generated from offshore wind turbines is transmitted to shore through cables laid along the seafloor or buried. Power may be converted at offshore substations and then transmitted to onshore substations where it can be distributed to homes and businesses.

Companies developing offshore wind projects are deploying or planning to deploy two types of offshore wind turbines in the U.S.: fixed bottom and floating. Fixed bottom turbines—currently deployed—are generally suitable for shallow waters (less than 200 feet in depth), such as the Atlantic Outer Continental Shelf and the area formerly known as the Gulf of Mexico. Floating turbines, for which the technology is under development, are better suited for deeper waters such as the Pacific and Gulf of Maine (see fig. 1).

Figure 1: Selected Offshore Wind Energy Structures and Turbine Types



Sources: GAO; Rudzhan/stock.adobe.com (power station). | GAO-25-106998

Note: Fixed turbines are planned in shallow water less than 200 feet in depth. Floating turbines are planned in deeper water greater than 200 feet in depth.

Larger turbines are grouped together into wind farms, which provide electricity to the power grid. Offshore turbines—often taller than the Statue of Liberty—tend to be taller than onshore turbines and can capture powerful ocean winds. The average turbine height for offshore turbines in

the U.S. was about 300 feet in 2016 and is projected to increase to about 500 feet by 2035.[9]

The Federal Role in Offshore Wind Energy Development

The Department of the Interior's BOEM is the primary agency overseeing the siting, review, and approval of wind energy projects in federal waters.[10] According to BOEM, its mission is to facilitate the responsible development of renewable energy resources on the Outer Continental Shelf through conscientious planning, stakeholder engagement, comprehensive environmental analysis, and sound technical review. The Energy Policy Act of 2005 mandated the development and issuance of regulations for the Outer Continental Shelf Renewable Energy Program.[11] The resulting BOEM and BSEE regulatory framework establishes a process for environmental and technical review of proposed offshore wind projects through each stage of development.[12]

Each project is subject to review under the National Environmental Policy Act of 1969 (NEPA).[13] Specifically, NEPA requires agencies to prepare a detailed statement of environmental effects.[14] Under the procedures

[9]The visibility of offshore wind turbines from shore is based on several factors, including the height of proposed wind turbine, landscape, and current weather conditions.

[10]The Bureau of Ocean Energy Management issues leases, easements, and rights-of-way for renewable energy development, including offshore wind, on the Outer Continental Shelf pursuant to authority provided under the Outer Continental Shelf Lands Act, Pub. L. No. 83-212, 67 Stat. 462 (1953), as amended by the Energy Policy Act of 2005, Pub. L. No. 109-58, tit. III, subtit. G, § 388(a), 119 Stat. 594, 744-46 (codified as amended at 43 U.S.C. § 1337(p)). The Outer Continental Shelf refers to the portion of submerged lands of the North American continental edge that is seaward of the territorial jurisdiction of all 50 states and certain territories but within U.S. jurisdiction and control, generally extending seaward from 3 geographical miles off the coastline to at least 200 nautical miles. 43 U.S.C. § 1331(a)(1); *see also id*. §§ 1301(a)–(b), 1302; Presidential Proclamation 5030 of March 10, 1983. The Outer Continental Shelf excludes areas conveyed by Congress to a territorial government for administration. 43 U.S.C. § 1331(a)(2); see also 48 U.S.C. § 1705.

[11]Pub. L. No. 109-58, § 388(a), 119 Stat. at 744-46 (codified in relevant part at 43 U.S.C. § 1337(p)(8)).

[12]30 C.F.R. pts. 285, 585.

[13]National Environmental Policy Act of 1969, Pub. L. No. 91–190, 83 Stat. 852 (1970) (codified as amended at 42 U.S.C. §§ 4321–47). Specifically, for any "major Federal actions significantly affecting the quality of the human environment," NEPA requires agencies to prepare a detailed statement of those effects. 42 U.S.C. § 4332(2)(C). At various agency decision points in the offshore wind development process, BOEM may prepare an environmental impact statement (EIS), an environmental assessment, or other documentation to comply with NEPA.

[14]42 U.S.C. § 4332(2)(C).

applicable during the time of this review and as of March 2025, this has typically taken the form of an environmental impact statement (EIS).[15] But where it is unclear whether an EIS is required for a particular agency action or decision, or the impacts are known not to be significant, the agency may first or instead prepare an environmental assessment, a more concise analysis. As part of its evaluation, the agency must consider reasonable alternatives to the proposed action, including a no-action alternative, as well as appropriate measures to mitigate environmental effects. At various agency decision points in the offshore wind development process, BOEM may prepare an EIS, an environmental assessment, or other documentation to comply with NEPA. BOEM also consults with the NOAA's National Marine Fisheries Service (NOAA Fisheries) under the Endangered Species Act of 1973 and the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (Essential Fish Habitat) and Fish and Wildlife Service under the Endangered Species Act of 1973.[16] BOEM also conducts consultations with Tribes and other affected parties pursuant to Section 106 of the National Historic Preservation Act.[17]

State and local governments generally provide primary approval for projects not on federal lands or outside of, but landward of, federal waters. Any wind energy project or facility associated with such a project to be constructed in state waters, including any cables that would be

[15]In an interim final rule issued in February 2025, effective April 11, 2025, the Council on Environmental Quality (CEQ) rescinded in their entirety CEQ's regulations which specified procedures for implementing NEPA. CEQ, "Removal of [NEPA] Implementing Regulations," 90 Fed. Reg. 10610 (Feb. 25, 2025). It is unclear at the time of this report to what extent all of the NEPA procedures discussed in this paragraph will continue to apply after that date.

[16]Magnuson-Stevens Fishery Conservation and Management Act of 1976, Pub. L. No. 94-265, 90 Stat. 331 (codified as amended at 16 U.S.C. §§ 1801–84); Endangered Species Act of 1973, Pub. L. No. 93-205, 87 Stat. 884 (codified as amended at 16 U.S.C. §§ 1531–44). BOEM consults with NOAA Fisheries or the U.S. Fish & Wildlife Service regarding the effects of a proposed BOEM-authorized action on Endangered Species Act-listed species and designated critical habitat, as required by Endangered Species Act § 7. 16 U.S.C. § 1536. In addition, the Marine Mammal Protection Act of 1972 generally prohibits the taking—including harassment or killing—of protected marine mammals. Nonetheless, NOAA Fisheries may permit unintentional and unavoidable, infrequent, or accidental taking of small numbers of animals where the taking would have negligible impact on the species, among other criteria. Pub. L No. 92-522, §§ 3, 101, 104, 86 Stat. 1027, 1028–33, 1034–36 (codified as amended at 16 U.S.C. §§ 1362, 1371, 1374); *see also* 50 C.F.R. §§ 216.101–216.108. BOEM consults with NOAA Fisheries regarding such permits. According to BOEM officials, no offshore wind project has applied for or has been authorized for lethal take of a marine mammal.

[17]Pub. L. No. 89-665, § 106, 80 Stat. 915, 917 (1966) (codified at 54 U.S.C. § 306108).

necessary to transmit power back to shore, is subject to applicable state regulation or requirements. The Coastal Zone Management Act of 1972 encourages states to develop and implement coastal zone management programs and plans to balance protection of habitats and resources in coastal waters with other interests, and to coordinate with federal agencies.[18]

Other state and federal agencies have additional roles and authority in the offshore wind project approval process, including the Marine Mammal Commission, under the Marine Mammal Protection Act of 1972.[19] Furthermore, agencies may also contribute expertise and information to the process. For example, the Department of Energy's (DOE) Wind Energy Technologies Office invests in activities that enable and accelerate innovations to advance onshore and offshore wind, while continuing to address market and other barriers to commercial deployment.

Federal agencies are to consult with Tribes on many infrastructure projects and other federal activities—commonly referred to as tribal consultation. Specifically, offshore wind development may involve various federal activities that trigger statutory and regulatory tribal consultation requirements, such as those under the National Historic Preservation Act, as amended.[20] In addition, executive directives call for federal agencies to

[18]Pub. L. No. 92-583, 86 Stat. 1280 (codified as amended at 16 U.S.C. §§ 1451–65). State coastal zone management programs that are approved by the Secretary of Commerce receive federal monetary and technical assistance. 16 U.S.C. §§ 1455, 1455a.

[19]Pub. L No. 92-522, 86 Stat. 1027 (codified as amended at 16 U.S.C. §§ 1361–1423h). The Marine Mammal Commission was established by the Marine Mammal Protection Act of 1972 and is charged with oversight of domestic and international policies and actions of federal agencies addressing human impacts on marine mammals and their ecosystems. See 16 U.S.C. §§ 1401–02, 1405.

[20]Under section 106 of the National Historic Preservation Act and its implementing regulations, federal agencies are to take into account the effects of their undertakings on historic properties through consultation between agency officials, Indian tribes, and others. Pub. L. No. 89-665, § 106, 80 Stat. 915, 917 (1966) (codified as amended at 54 U.S.C. § 306108); 36 C.F.R. pt. 800. Section 106 applies to undertakings, which are projects, activities, or programs that are funded in whole or in part by a federal agency and under the agency's direct or indirect jurisdiction, including those carried out by or on behalf of a federal agency, those carried out with federal financial assistance, and those requiring a federal permit, license, or approval. 36 C.F.R. § 800.16(y). The National Historic Preservation Act specifically requires federal agencies, in carrying out their section 106 responsibilities, to consult with Indian Tribes that attach religious and cultural significance to a historic property. 54 U.S.C. § 302706(b).

consult with federally recognized Tribes on activities that may have tribal implications.[21]

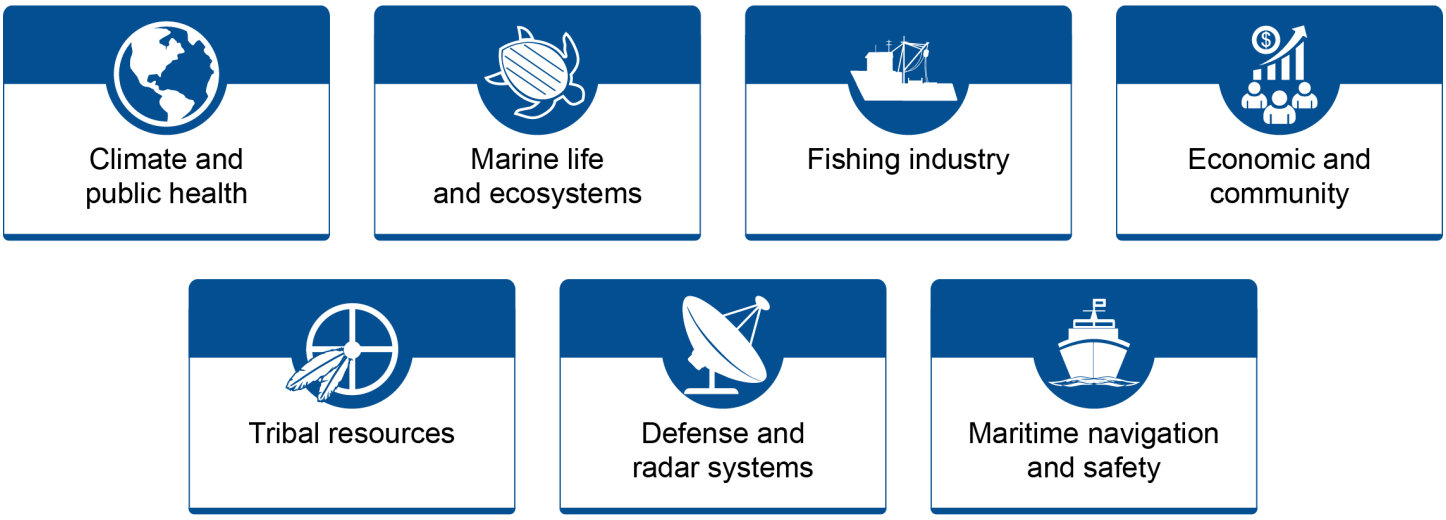
Offshore Wind Energy Development Has Both Positive and Negative Potential Impacts, and Research to Understand and Address Some Effects Is Ongoing

Offshore wind energy development has various positive and negative potential impacts in several areas. These include impacts on climate and public health, marine life and ecosystems, fishing industry, economic and community, tribal resources, defense and radar systems, and maritime navigation and safety (fig. 2). The extent of impacts will vary depending on the location, size, and type of offshore wind infrastructure. Also, developers can implement measures to avoid or mitigate potential impacts.[22] However, because technology and implementation are still developing, the extent of some impacts is unknown. In addition, uncertainty exists about long-term and cumulative effects, but research and monitoring activities are ongoing to better understand potential impacts.

[21]We have reported on tribal consultation, including federal agencies' policies and processes for consulting with Tribes on infrastructure. GAO, *Tribal Consultation: Additional Federal Actions Needed for Infrastructure Projects*, GAO-19-22 (Washington, D.C.: Mar. 20, 2019).

[22]In July 2024, we released a technology assessment examining technologies and approaches to help address the environmental effects of onshore and offshore wind energy development. The report discusses (1) technologies or approaches to help reduce the potential environmental effects related to the life cycle of utility-scale wind energy projects, (2) challenges that might hinder implementation of these technologies or approaches, and (3) policy options to help address these challenges. GAO, *Wind Energy: Technologies and Approaches to Help Address Environmental Effects*, GAO-24-106687 (Washington, D.C.: July 23, 2024).

Figure 2: Potential Areas of Offshore Wind Impacts



Source: GAO (analysis and icons). | GAO-25-106998

Deployment of Offshore Wind Could Have Positive Climate and Public Health Benefits

Offshore wind energy deployment could have positive climate and public health impacts, according to experts we spoke with and documents we reviewed. Three experts told us that, to the extent that offshore wind replaces fossil fuel energy sources, deployment of offshore wind could reduce greenhouse gas emissions that contribute to climate change. And two of the experts also said it could improve public health outcomes through improvements in air quality. According to an October 2024 analysis, deployment of the currently planned or proposed offshore wind farms in the Atlantic and Gulf coasts could reduce U.S. greenhouse gas emissions by 5 percent by 2035.[23] One expert we interviewed also told us that offshore wind can complement other renewable energy sources, such as solar, during periods of high energy demand. Another expert said that wind can enhance the benefits of electrified vehicles and homes by compounding emissions reductions.

[23]The October 2024 analysis estimated that deploying 32 planned or proposed offshore wind farms along the Atlantic and Gulf coasts of the U.S. could reduce system-wide power sector greenhouse gas emissions by approximately 41 million short tons, or 5 percent, of carbon dioxide equivalent. Resources for the Future, *Offshore Wind Power Examined: Effects, Benefits, and Costs of Offshore Wind Farms Along the US Atlantic and Gulf Coasts,* (October 2024).

Reducing reliance on fossil fuels by adopting resources like offshore wind could also reduce pollutants that affect public health.[24] Communities near fossil fuel power plants, including disadvantaged communities, would likely see the greatest health benefits from a transition to renewable energy sources, though smaller positive benefits would still be seen in large geographic regions, according to one expert we interviewed.[25] The expert added that disadvantaged communities may also experience some negative impacts from offshore wind energy development, such as environmental and health effects from increased emissions and pollution from onshore and near-shore construction, but those negative impacts are unlikely to cancel out the benefits of reduced fossil fuel use.[26]

Offshore Wind Development Could Have a Variety of Impacts on Marine Life and Ecosystems, but Research Is Ongoing

The development and operation of offshore wind energy facilities could have a variety of impacts on marine life and ecosystems. These include acoustic disturbance from survey and construction activities, changes to marine habitats from the installation of offshore wind structures, hydrodynamic and wind wake effects from wind turbine operations, and physical risks to marine life and birds from wind structures and new vessel activity, according to experts we spoke with and documents we reviewed (see table 2).

[24]According to EPA, fossil fuel-fired power plants are a leading source of air, water, and land pollution that affects communities, including nitrogen oxides, sulfur dioxide, mercury, and fine particle emissions. Environmental Protection Agency, “Human Health & Environmental Impacts of the Electric Power Sector,” last modified October 21, 2024, https://www.epa.gov/power-sector/human-health-environmental-impacts-electric-power-sector.

[25]For example, health benefits could include reduced occurrences of asthma and cardiovascular disease along with the associated costs of missed days of work or school, emergency room visits, and hospitalizations, according to one expert.

[26]In this report, we use the term “disadvantaged communities” to refer to communities that have been historically marginalized and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and health care, as described in Exec. Order No. 14,008, Tackling the Climate Crisis at Home and Abroad, 86 Fed. Reg. 7619 (Feb. 1, 2021) (revoked by E.O. 14148 of Jan. 20, 2025, “Initial Recissions of Harmful Executive Orders and Actions,” 90 Fed. Reg. 8237 (Jan. 28 2025)).

Table 2: Examples of Potential Impacts of Offshore Wind Development to Marine Life and Ecosystems

Impact	Description
Acoustic disturbance	Construction and survey activities produce underwater noise that can disturb sensitive marine species. Offshore wind projects take measures to mitigate underwater noise, including the use of bubble curtains to dampen pile driving sound and pausing operations if protected species are sighted.
Changes to marine habitat	Installation of infrastructure, such as turbine foundations and transmission cables, introduces new structures and causes changes to the ocean floor that can alter marine habitat and affect the distribution, abundance, and composition of marine life in the area. These new structures can create artificial habitat that may benefit some species while displacing others and could affect bottom-dwelling species through disturbing the seabed. Artificial habitat effects of wind turbines are well documented, but research is ongoing to monitor and understand impacts on marine life.
Hydrodynamic effects	Operation of wind turbines can affect hydrodynamics and ocean processes such as currents and wind wakes, but little is known about regional effects of widescale deployment on ecosystems.
Vessel disturbance	Vessels can disturb some species and pose strike risks to large marine animals, but the increase in offshore wind vessels is projected to be small compared to the total volume of vessel traffic. Offshore wind vessels are required to take measures such as following speed restrictions and employing protected species observers.
Entanglement risk	Structures, such as mooring cables from floating wind turbines, could snag fishing gear and other marine debris and create entanglement risk to marine animals. Wind projects employ measures to minimize entanglement (e.g., mooring systems designed to detect entanglement), but there is uncertainty about the extent of the risk from floating turbines because of limited deployment.[a]
Collision risk to birds and bats	Turbine blades pose a collision risk to some sea birds, but little is known about offshore collision risk to bats. Research on collision risks and mitigation measures (e.g., lighting and curtailment) is ongoing.

Source: GAO review of documents and expert testimony. | GAO-25-106998

[a]There are no floating offshore wind projects operating or under construction currently in the U.S., but a pilot project is in development in the Gulf of Maine.

According to eight experts we interviewed, some potential impacts of offshore wind development to marine life and ecosystems are not well understood, but research and monitoring is ongoing or planned. In addition, seven experts said that because there are variations in species and ocean conditions, known impacts from existing wind farms may not apply to other offshore wind projects. They added that the extent of the impacts depends on many factors, such as the location, size, and type of offshore wind infrastructure.

Moreover, changing ocean conditions due to climate change and other human activities are making it difficult to understand the potential effects of offshore wind development, according to five experts we spoke with and documents we reviewed. According to the Fifth National Climate Assessment, climate change is altering marine ecosystems and causing marine species to change their distribution, seasonal activities, and

behaviors.[27] Three experts we interviewed also told us that climate change is rapidly altering marine species behavior and habitats, making it difficult to obtain baseline data on the ocean and species populations. One state official said lobster populations have already migrated away from state waters because of warming ocean temperatures.[28]

Additional detail on each of the potential impacts on marine life and ecosystems follows.

Acoustic Disturbance from Surveys and Construction

Offshore wind development has the potential to affect marine animals sensitive to underwater noise, such as whales. Such impacts can occur through activities such as sea floor mapping and construction, according to experts we spoke with and documents we reviewed. Offshore wind development activities produce varying levels of underwater noise throughout each phase of development and operation. Specifically,

- Developers explore potential wind generation sites using high resolution geophysical surveys, which may disturb sensitive species. BOEM determined that these surveys are unlikely to injure marine mammals, and two experts we interviewed said that surveys for oil and gas development on the Outer Continental Shelf has used more powerful survey acoustic tools without resulting in whale strandings.[29]
- Construction activities, such as pile driving fixed-bottom turbine pylons into the sea floor, can create intense undersea noise that could cause disturbance or potential injury to marine mammals.[30] Three experts told us that, while pile driving could cause auditory injury to marine

[27]US Global Change Research Program, *Fifth National Climate Assessment: Chapter 10* (Washington, D.C.: June 6, 2024).

[28]An October 2024 study from the University of Maine found that American lobster populations declined in the Gulf of Maine as a result of warming ocean temperatures. Robert N. Jarrett II, Damian C. Brady, Richard R. Wahle, and Robert S. Steneck, "Shifts in habitat use and demography of American lobsters in coastal Maine (USA) over the past quarter century," *Marine Ecology Progress Series*, vol. 746 (2024): 87–89.

[29]Carolyn D. Ruppel, Thomas C. Weber, Erica R. Saaterman, Stanley J. Labak, and Patrick E. Hart, "Categorizing Active Marine Acoustic Sources Based on Their Potential to Affect Marine Animals," *Journal of Marine Science and Engineering*, vol. 10 (2022).

[30]According to the DOE-commissioned U.S. Offshore Wind Synthesis of Environmental Effects Research (SEER) project, pile driving offshore wind turbine foundations into the ocean floor generates a significant amount of noise that can cause auditory injury to marine life at close ranges. National Renewable Energy Laboratory and Pacific Northwest National Laboratory, *Environmental Effects of U.S. Offshore Wind Energy Development: Compilation of Educational Research Briefs*, report for the DOE Wind Energy Technologies Office (2022).

mammals at short ranges, animals tend to move away from construction areas when activity begins.

- Consistent, low-intensity noise from the operation of turbines is similar to existing ambient sound in the ocean and has a very low probability of causing potential harm to fish and marine mammals, according to a 2023 BOEM-commissioned study.[31]
- Dismantling offshore wind turbines at the end of their operational period may result in moderate undersea noise for a limited period.[32] While no offshore wind farms in the U.S. have reached the end of their operational lifespan, BOEM will conduct an environmental assessment of any proposed decommissioning activities.

Offshore wind developers take measures to mitigate these impacts via long-term monitoring of noise as well as whale and fish vocalizations in the lease area before, during, and following construction. Additional monitoring and mitigation measures include (1) the use of bubble curtain technology to dampen pile-driving noise, (2) employing protected species observers and using acoustic monitoring technology to ensure construction areas are free of marine mammals, and (3) restricting construction activities to times when sensitive species are less likely to be in the area.

NOAA Fisheries does not anticipate any death or serious injury to whales from offshore wind related actions and has not recorded marine mammal deaths from offshore wind activities.[33] However, one expert we

[31]The study noted that the cumulative impact from operational sound could be different and recommended future monitoring for larger planned facilities to study any effects of simultaneously operating turbines. HDR, *Field Observations During Offshore Wind Structure Installation and Operation, Volume 2*, Final Report to U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, No. OCS BOEM 2023-033 (June 2023).

[32]According to the SEER project, decommissioning of offshore wind farms involves using support vessels to dismantle various components and can generate noise levels with the potential to disturb marine life. National Renewable Energy Laboratory and Pacific Northwest National Laboratory, *Environmental Effects of U.S. Offshore Wind Energy Development.*

[33]According to NOAA Fisheries web page about interactions between offshore wind energy projects and whales, there is no current scientific evidence that noise resulting from offshore surveys could potentially cause whale deaths and there are no known links between large whale deaths and ongoing offshore wind activities. NOAA Fisheries also does not anticipate death or serious injury of whales for any wind-related action. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, “Frequently Asked Questions—Offshore Wind and Whales,” last modified March 14, 2024, https://www.fisheries.noaa.gov/.

interviewed said there is some uncertainty about sound thresholds that marine mammals can endure before injury occurs because researchers cannot ethically test such conditions on marine mammals. Studies are ongoing on these acoustic effects. BOEM's Center for Marine Acoustics supports research on underwater noise and promotes policies to address acoustic impacts of offshore wind activities.[34] NOAA Fisheries has also released new draft technical guidance for assessing noise impacts on marine mammals.[35] In addition, BOEM and NOAA are coordinating to evaluate and mitigate the potential impacts on the critically endangered North Atlantic right whales.[36]

Changes to Marine Habitats from Infrastructure

The installation of offshore wind infrastructure can affect marine habitats through changes to ocean and sea floor compositions. These changes may result in beneficial effects for some species while potentially displacing others, according to experts we spoke with and documents we reviewed. According to DOE's U.S. Offshore Wind Synthesis of Environmental Effects Research (SEER) project, installation of offshore wind infrastructure is known to change the composition of the seabed and

[34]BOEM established the Center for Marine Acoustics in 2020 to build the bureau's expertise and strengthen its role in managing and understanding underwater sound. The Center provides expertise and leadership to drive best practices, expand research on underwater sound, seek policy improvements, and improve messaging related to marine acoustic issues. Bureau of Ocean Energy Management, "Center for Marine Acoustics," accessed December 16, 2024, https://www.boem.gov/center-marine-acoustics.

[35]National Oceanic and Atmospheric Administration, National Marine Fisheries Service, *2024 Update to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0): Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts*, NOAA Technical Memorandum (Silver Spring, Md.: 2024).

[36]BOEM and NOAA partnered to develop a North Atlantic Right Whale Strategy. According to the strategy, the population size of North Atlantic right whales is small enough that the death of even very few individuals can have a measurable effect on its population status, trend, and dynamics. The strategy supports three goals: (1) mitigation and decision-support tools; (2) research and monitoring; and (3) collaboration, communication, and outreach. These goals and actions include collaborations between BOEM, NOAA, and partners, including the offshore wind industry. Bureau of Ocean Energy Management and National Oceanic and Atmospheric Administration, *BOEM and NOAA Fisheries North Atlantic Right Whale and Offshore Wind Strategy* (January 2024).

create structures that affect the behavior of marine life.[37] The increased levels of sediment during ocean construction may disrupt marine life for a limited time, but the introduction of structures and changes to the sea floor can create various positive long-term changes to marine habitat. For example, seven experts we interviewed told us that the insertion of the offshore wind structures can create new habitat that benefits some fish and other marine life, known as an artificial reef effect. Three experts said that this artificial reef effect has been demonstrated on multiple offshore wind projects, including several European offshore wind facilities as well as the Block Island Wind Project in Rhode Island.

However, two experts told us there is uncertainty about the extent to which new habitat created by offshore wind infrastructure increases fish productivity versus attracting existing species from other areas. Furthermore, although these changes can benefit some species, they may also displace existing marine life. One expert we interviewed said that seabed disturbance may disrupt scallop populations. Another expert pointed out that new habitats may also create favorable conditions for invasive species. According to DOE's SEER report, infrastructure transported to installation sites may introduce invasive species.[38]

In addition to turbine structures, submerged power cables connecting offshore wind facilities with shoreside distribution networks have the potential to disrupt habitat and may affect the behavior of some sensitive species. The DOE's SEER project reported that the burying of undersea power cables disturbs the seabed, potentially disrupting bottom-dwelling marine life and causing temporary changes to sediment and water composition. The SEER project also reported that some species may be sensitive to electromagnetic frequencies emitted by transmission cables, but it noted there is not conclusive evidence to suggest frequencies from

[37]At the direction of DOE's Wind Energy Technologies Office, Pacific Northwest National Laboratory and National Renewable Energy Laboratory are jointly leading a multi-year collaborative effort to facilitate knowledge transfer for offshore wind research around the world. The SEER effort aims to synthesize key issues and disseminate existing knowledge about environmental effects, inform applicability to U.S. waters, and prioritize future research needs. National Renewable Energy Laboratory and Pacific Northwest National Laboratory, *Environmental Effects of U.S. Offshore Wind Energy Development*.

[38]National Renewable Energy Laboratory and Pacific Northwest National Laboratory, *Environmental Effects of U.S. Offshore Wind Energy Development.*

offshore wind infrastructure will impact marine life.[39] One expert we interviewed said there are not significant electromagnetic impacts to marine life from a single cable, but more research is needed about potential cumulative impacts as the number of cables increases.

Offshore wind infrastructure also poses some risk of marine debris and pollution, which could include oil leaking from the turbine or debris from a structural failure. For example, following a blade failure off the coast of Massachusetts, fiberglass debris fell into the ocean and washed onshore in surrounding communities.

Hydrodynamic Effects from Turbine Operations

Offshore wind could have effects on wind currents and ocean circulation that could affect marine life, but there is uncertainty about the extent of these effects, according to two experts we spoke to and documents we reviewed. According to a National Academies study, wind turbines create localized hydrodynamic effects—such as changes in water temperature, turbulence, and nutrient availability.[40] However, two experts told us that regional effects of wind farms on ocean circulation patterns are difficult to quantify because of the lack of data and other natural and anthropogenic factors, such as warming waters due to climate change. Furthermore, two West Coast fisheries stakeholders and a representative from one Tribe told us they are concerned that changes to upwelling could impact other marine species and fisheries along the Pacific coast.[41] NOAA Fisheries

[39]According to DOE's SEER project, offshore wind power cables are sources of electromagnetic fields that can be detected by certain species, such as some fish, sharks, whales and dolphins, sea turtles, and invertebrates, including some snails, lobsters and crabs. National Renewable Energy Laboratory and Pacific Northwest National Laboratory, *Environmental Effects of U.S. Offshore Wind Energy Development.*

[40]The National Academies study found that offshore wind turbines can alter local hydrodynamics but extrapolating regional effects across wind farms is complex. The study noted that is important to understand these hydrodynamic effects to regional ecosystems, such as impacts on phytoplankton and marine mammals, but found that it is difficult to differentiate the effects of offshore wind from other natural and anthropogenic effects, including climate change. National Academies of Sciences, Engineering, and Medicine, *Potential Hydrodynamic Impacts of Offshore Wind Energy on Nantucket Shoals Regional Ecology: An Evaluation from Wind to Whales,* Consensus Study Report (Washington, D.C.: 2024).

[41]A study on projected changes to upwelling from offshore wind development along the California coast found that development of large-scale offshore wind farms could affect wind-driven upwelling, nutrient delivery, and ecosystem dynamics, but the consequences of these changes are currently unknown. Kaustubha Raghukumar et al., "Projected cross-shore changes in upwelling induced by offshore wind farm development along the California coast," *Communications, Earth, and Environment*, vol. 4, no. 116 (2013): https://doi.org/10.1038/s43247-023-00780-y.

has set a research priority of understanding oceanographic effects, including upwelling.[42]

Vessel Traffic Impacts on Marine Life

Vessel traffic associated with offshore wind construction and operations could have impacts on marine life. These include disturbance of marine species from vessel noise and some risk of vessel strikes on large marine animals, such as whales, according to experts we spoke with and documents we reviewed. Four experts told us that vessel activity during offshore wind development and operations poses some risk of vessel strikes. However, a study of planned offshore wind traffic found that the increase in offshore wind vessel activity is projected to be small compared to the total volume of vessel traffic anticipated over time.[43] According to NOAA Fisheries—the agency responsible for tracking vessel strikes—there are no known links between offshore wind energy development and large whale deaths.[44] Furthermore, vessels involved in offshore wind activities take measures to minimize strike risk, such as observing speed restrictions and employing observers to monitor and report marine mammal activity.[45]

Entanglement Risk

Offshore wind development may also pose some risk of entanglement with offshore wind infrastructure and other marine debris, according to experts we interviewed and documents we reviewed. According to DOE's SEER project, the likelihood of marine life becoming directly entangled with offshore wind cable systems is low, but there is a greater risk of secondary entanglement—entanglement with debris such as fishing nets

[42]National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northwest Fisheries Science Center, *NMFS West Coast Offshore Wind Energy Strategic Science Plan* (October 2024).

[43]A Cumulative Vessel Traffic Assessment commissioned by the New York State Energy Research and Development Authority modeled the expected increase in vessel traffic resulting from planned offshore wind projects. The study compared of offshore wind and non-offshore wind vessel traffic forecasts in New York State waters and found that the relative increase in vessel traffic incurred by the projects at each passage line is small compared with the total volume of vessel traffic anticipated over time. New York State Energy Research and Development Authority, *Offshore Wind Ports: Cumulative Vessel Traffic Assessment*, Report Number 22-11 (New York, N.Y.: August 2022)

[44]National Oceanic and Atmospheric Administration, "Marine Life in Distress: Frequently Asked Questions—Offshore Wind and Whales," last modified March 14, 2024, https://www.fisheries.noaa.gov/.

[45]Bureau of Ocean Energy Management, *New York Bight Final Programmatic Environmental Impact Statement, Vol II: Appendix G* (Washington, D.C.: October 2024).

snagged on offshore wind structures.[46] One expert we interviewed said that floating wind structures pose an entanglement risk because of the length of the mooring cables needed to anchor turbines to the ocean floor. Wind project developers employ some measures to mitigate entanglement risk, such as using mooring systems designed to avoid entanglement and monitoring and reporting any entanglements. That said, the SEER project stated that little is known about secondary entanglement risks of floating wind mooring cables because limited offshore wind development has occurred.[47] Currently, floating wind farms are not operational in U.S. waters, but a pilot project is under development in the Gulf of Maine.

[46]National Renewable Energy Laboratory and Pacific Northwest National Laboratory, *Environmental Effects of U.S. Offshore Wind Energy Development.*

[47]National Renewable Energy Laboratory and Pacific Northwest National Laboratory, *Environmental Effects of U.S. Offshore Wind Energy Development.*

Figure 3: Offshore Wind Energy and Whales

North Atlantic right whale Pediddle (#1012) and calf.

What is known about the unusual mortality event in whales?

Since at least 2017, several species of large marine mammals have experienced an unusual mortality event (UME), or the death of an unexpectedly high proportion of a population. According to the National Oceanic and Atmospheric Administration (NOAA), the leading cause of the UME for large whales, including humpback whales and critically endangered North Atlantic right whales, is human interaction, specifically from entanglements with fishing gear and vessel strikes.

Experts we interviewed agreed that vessel strikes, such as strikes from shipping vessels, and entanglement with fishing gear pose a risk to whales. Additionally, experts told us that climate change is affecting whales by altering sea temperature and prey availability.

According to NOAA, there are no known links between large whale deaths and ongoing offshore wind activities.

Double bubble curtain surrounding pile driving operations at an offshore wind site.

Potential Impacts from Offshore Wind Energy Development

Offshore wind energy development activities have the potential to disturb sensitive marine mammals, including whales.

Acoustic impacts. Noise from survey and constructing activities, such as pile driving, has the potential to disturb whales. Experts told us that while pile driving could possibly injure whales at close range, whales move away from the area when activity begins.

Vessel strikes. Offshore wind vessels could pose some strike risk to whales, but one expert told us that the increased risk would be minor compared to existing maritime activity. Additionally, offshore wind vessels are required to observe speed restrictions to reduce risk to whales.

Secondary entanglement. Offshore wind structures, such as floating turbine mooring cables, could potentially snag marine debris like fishing nets that pose some risk to whales.

Humpback whale breaching.

Required Mitigations

The Bureau of Ocean Energy Management (BOEM) requires lessees to implement multiple mitigation strategies to reduce the impact of surveying, construction, and operations activities on whales and other protected species. For example, operators must:

- establish acoustic exclusion zones to ensure survey and construction areas are clear of marine mammals;
- employ protected species observers to avoid vessel strikes and shut down operations if marine mammals are spotted;
- require all vessels to follow speed restrictions to minimize the risk of vessel strikes;
- use protective measures to reduce acoustic impacts from pile driving, including the use of sound-dampening bubble curtains and slow-starts to warn marine mammals away from the area before beginning construction; and
- restrict pile driving operations to times when marine mammals are least likely to be present.

Sources: GAO analysis of agency documents and expert testimony; NOAA Fisheries (top and middle photo); Dominion Energy (bottom photo). | GAO-25-106998

Collision Risk to Birds and Bats from Turbines

Offshore wind turbines may pose risks to bird and bat populations in the offshore environment, according to experts we interviewed and documents we reviewed. According to DOE's SEER project, sea birds are at risk of colliding with offshore wind turbine blades, though activity may vary at certain times of the day or year, such as during seasonal migration. Species that roost on artificial structures or prey on marine life around turbine structures are at greater risk of collision. Furthermore, the project found that many species at risk of collision are in decline because of existing stresses, such as the effects of climate change and human activity. Similarly, some bat species may be at risk of collision with wind turbine blades, but less is known about offshore collision risk to bats. While onshore wind turbines pose a known collision risk for bats, it remains unclear whether offshore wind development poses a significant risk, according to DOE's SEER project and one expert we interviewed.[48]

There is some research on bird collision risk around European offshore wind farms, but data on bird and bat collision risk in the U.S. are limited because of the limited deployment of offshore wind projects as well as challenges monitoring and collecting affected animals in an offshore environment.[49] Developers can implement mitigation measures to minimize impacts to birds and bats. These measures include installation of devices to deter birds from perching on wind turbines and developing monitoring plans to enhance understanding of bird and bat impacts.

Offshore Wind Development Could Have Negative Impacts on the Fishing Industry and Fisheries Management

Offshore wind development could have negative impacts on the fishing industry. These impacts include restricting access to fishing grounds and preventing fishery surveys in areas of development, according to experts and fisheries stakeholders we spoke with and documents we reviewed. For example, offshore wind development could impede or prevent access to certain fishing grounds and impact the livelihood and safety of commercial fishermen. For example, fishing near offshore wind turbines would not be possible for scallopers, according to four fisheries stakeholders familiar with the scallop industry. Scallopers use fishing gear that could become entangled with transmission cables or structures

[48]The SEER project reported that some bat populations have been observed offshore, including at least seven species along the Atlantic Coast and at least one species along the Pacific Coast. National Renewable Energy Laboratory and Pacific Northwest National Laboratory, *Environmental Effects of U.S. Offshore Wind Energy Development.*

[49]The SEER project reported that some European bird populations avoid wind farms, while other species are attracted to turbines for potential roosting and foraging activities. National Renewable Energy Laboratory and Pacific Northwest National Laboratory, *Environmental Effects of U.S. Offshore Wind Energy Development.*

installed to cover and protect seabed cables. The loss of access to fishing grounds could result in a loss of income for commercial fishermen in certain areas.[50] However, recreational fishermen may benefit from increased and more varied fish stocks around wind turbines in some areas.[51] One expert and three fisheries stakeholders we spoke with from different geographic regions said recreational fishermen were optimistic about fishing opportunities near the new wind turbine structures.

In addition, fishermen were concerned that fishing around offshore wind turbines may not be allowed or safe, according to six fisheries stakeholders. However, as of December 2024, according to BOEM documentation, the Coast Guard had not implemented or announced restrictions on fishing activities around offshore wind turbines in operation on the U.S. Outer Continental Shelf.[52] Four fisheries stakeholders told us that there are also concerns about insurance for commercial fishermen, including that the cost of insurance could increase or that it could be denied to vessels that operate near offshore wind turbines. One fisheries stakeholder noted that floating offshore wind turbines could pose additional risks, and that even some recreational fishing vessels may be barred from floating offshore wind arrays because their fishing gear could become tangled on the turbine mooring cables.

Moreover, offshore wind development could also affect the quality of data used to manage fisheries by making data collection in lease areas difficult

[50]In 2020, in New Bedford, Massachusetts—the port with the highest valued catch in the U.S.—scalloping accounted for more than 80 percent of $376.6 million in seafood revenue. The port docks more than 500 scallopers and fishermen, according to the New Bedford Port Authority.

[51]According to fisheries stakeholders from the area formerly known as the Gulf of Mexico, recreational fishermen have fished around offshore oil and gas platforms, and the submerged parts of these structures act as artificial reefs, providing new habitats that attract fish and other marine species. Two fisheries stakeholders and one expert noted other potential strategies to reduce the financial impacts to commercial fishermen, including supplemental income streams, such as marine aquaculture, or the breeding, raising, and harvesting of fish, shellfish, and aquatic plants in water environments.

[52]BOEM officials told us that BOEM and developers do not have the authority to restrict access to fishing activities around offshore wind turbines. Commercial and recreational fishing are generally not allowed in offshore wind project areas in Europe, according to a European Commission conflicting interests study summary. The Coast Guard has implemented some restrictions on activity around offshore wind projects during construction activities, according to agency officials. These officials also told us that they have encountered recreational divers and fishermen in active construction zones and needed to warn them away. Furthermore, Coast Guard officials told us that, while it works with NOAA to enforce fishing laws, the authority to restrict fishing activities resides with NOAA.

or impossible, according to four fisheries stakeholders. Specifically, NOAA monitors species abundance data using bottom trawling gear that inform fisheries management policies and the levels of fish that fishermen can harvest. If accurate data are not available, fishery management council officials told us they would likely implement more conservative policies, limiting the number of fish that can be harvested. This could lead to reduced income for fishermen and could also lead to increased fish stocks since fishermen would not be allowed to harvest as many fish.

The primary planned mitigation strategy for commercial fisheries is compensation from offshore wind developers. The Fisheries Mitigation Project—organized by 11 East Coast states—seeks to provide a regional framework to compensate commercial fishermen for economic losses due to offshore wind energy development.[53] Seven fisheries stakeholders expressed concern about how compensation would work, including worries that the Fisheries Mitigation Project could not support fishermen over the lifetime of offshore wind projects and that it may be difficult to prove that fishermen worked in the areas before construction. The Fisheries Mitigation Project is still in development, and procedures for applying for compensation have not been established.

Offshore Wind Development May Have Various Economic Development and Community Impacts

Economic development. The development and operation of offshore wind energy facilities could result in economic and community development, including creating jobs and investments in ports and communities, according to experts we interviewed and documents we reviewed. For example, multiple port modernization projects are underway in Massachusetts.[54] In addition, the offshore wind industry could create thousands of jobs to support manufacturing and

[53]The Fisheries Mitigation Project is organized by Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Rhode Island, and Virginia.

[54]For example, in August 2024, the Massachusetts Clean Energy Center—a state economic development agency—announced plans for the expansion and improvement of the New Bedford Marine Commerce Terminal, a 30-acre facility constructed and operated for the construction, assembly, and deployment of offshore wind projects. The state agency has committed $45 million in funding for the project as part of $180 million investment in a portfolio of seven offshore wind port redevelopment projects in New Bedford, Salem, and Somerset.

development, according to federal and state reports we reviewed.[55] However, the number of net jobs created may vary by project and location, and the net benefits to local economies could be negligible in some cases, depending on the extent of potential loss of jobs in the fishing industry. While some fishing operations are mitigating income loss by working for offshore wind energy developers (e.g., providing safety perimeters during turbine construction), it is difficult to know the extent of offshore wind's overall economic impact on the communities. For example, cities like New Bedford, Massachusetts, have onshore industries and infrastructure that support seafood harvesting, including ice suppliers and seafood processors, that could be impacted.

Cultural and community impacts. Offshore wind development may affect communities in other ways. For example, fishing communities may see cultural shifts if commercial fishing becomes less economically viable due to offshore wind projects, according to officials we interviewed and documents we reviewed. Communities that have developed around the fishing industry, with multi-generational ties to fishing, may be displaced, according to one representative of a coastal community. Furthermore, some members of coastal communities have also raised concerns about potential impacts to some cultural sites, such as viewsheds and shipwrecks located in wind lease areas or along transmission cable routes. Representatives of coastal communities and those charged with historic preservation duties also said that historic districts or houses with views of the coastal horizons could be impacted by offshore wind installations. The presence of wind farms could diminish the integrity of historic properties whose key characteristics include associated views of the ocean or a maritime environment, according to officials from the Advisory Council on Historic Preservation. Some developers plan to compensate communities affected by impacts to viewsheds through community development funds, according to developer documents.

[55]For example, according to the National Renewable Energy Laboratory, offshore wind energy development may create up to 58,000 jobs by 2030. National Renewable Energy Laboratory, *U.S. Offshore Wind Workforce Assessment* (Golden, Colo.: October 2022). This estimate includes associated jobs in manufacturing, construction, and operations and maintenance, among other things. A 2022 report prepared for the New Jersey Governor's office estimates that more than 18,000 jobs will be created in the state by 2030. These estimates primarily include manufacturing jobs, such as fabricating component parts for wind turbines, and induced jobs, such as jobs in food service and retail industries. New Jersey Economic Development Authority and The Governor's Office of Climate Action and the Green Economy, *New Jersey's Offshore Wind Workforce Assessment Through 2035* (September 2022).

Offshore Wind Development Could Negatively Affect Tribal Resources, Including Sacred Sites and Established Fishing Grounds

Offshore wind development, including the installation of infrastructure such as turbines and undersea cables, have the potential to disturb submerged sacred sites, restrict access to established tribal fishing grounds, and alter viewsheds with cultural and religious importance, according to tribal officials we spoke with and documents we reviewed.

Impacts to Sacred Tribal Sites and Viewsheds

Submerged archaeological sites, which include sacred tribal sites and may contain tribal artifacts and human remains, can be disturbed or damaged when offshore wind developers conduct seabed surveys or lay cables, according to several representatives from Tribes and tribal organizations. Thousands of years ago, ancestral lands extended into what is now the ocean, such as in the Heceta Banks, Oregon, and Martha's Vineyard, Massachusetts, areas. Development such as cable landings could also affect onshore archaeological sites of tribal significance.

Offshore wind development could also change viewsheds with religious and cultural importance by disrupting historically uninterrupted horizons. The sunrise and sunset have important religious or cultural meaning to several Tribes on the East and West Coasts, according to representatives from several Tribes. For example, one tribal official told us that the lights from offshore wind turbines may disrupt traditional prayer and dance ceremonies.

Restricted Access to Tribal Fishing Grounds

Offshore wind energy development can also affect tribal access to established fishing grounds, according to many tribal representatives we spoke with. On the West Coast, several Tribes have treaties that guarantee access to established (usual and accustomed) fishing grounds in the Pacific Ocean. There are currently no leased or proposed wind energy areas that overlap with these established fishing grounds, but, according to one tribal official, offshore wind activities in other areas of the Pacific could affect spawning or migration of the fish harvested from the established fishing grounds. One expert also told us that displaced fishermen from offshore wind areas might relocate to established tribal fishing grounds, causing overcrowding.

Moreover, because offshore wind development poses potential risks to marine life, it could also pose risks to Tribes' ability to fulfill their ocean stewardship responsibilities. As stewards and co-stewards of the ocean, some Tribes on the East and West coasts are responsible for protecting

the environment and wildlife, according to representatives from several Tribes.[56]

Offshore Wind May Have Impacts on Defense and Radar Systems

Wind turbines can reduce the performance of radar systems used for defense and maritime navigation and safety in several ways. These include reducing detection sensitivity, obscuring potential targets, and generating false targets, according to a DOE report.[57] In addition, offshore wind energy development may affect larger military exercises by obstructing flight and surface and subsurface vessel movement, according to DOD officials.

Wind turbines are constructed predominantly of steel that has a high electromagnetic reflectivity, according to a 2022 National Academies report.[58] As a result, the turbines and rotating blades can make it hard to see targets on different radar systems, including high-frequency and marine vessel radar.[59] The breadth and magnitude of the potential impacts to radar systems will not be fully known until more offshore wind structures are built in U.S. waters, according to one expert. Several factors influence the extent to which radar systems are affected by offshore wind turbines. According to two experts we interviewed, the position, height and spacing of offshore wind turbines can affect how much interference occurs, including whether a wind farm is in the line of sight between a radar system and the targeted region.

Some mitigation strategies exist, or are under development, to address radar interference. For example, DOD can request the exclusion of areas

[56]In 2021, the Department of the Interior and the U.S. Department of Agriculture signed joint Secretarial Order 3403, which, among other efforts, directs these agencies to promote the use of co-stewardship agreements with federally recognized Tribes for federal lands and waters to fulfill their federal trust obligation. Department of the Interior, Department of Agriculture, *Joint Secretarial Order on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters*, Order No. 3403 (Washington, D.C.: November 2021; amended November 30, 2022).

[57]Department of Energy, *Update on the Efforts of the Wind Turbine Radar Interference Mitigation Working Group* (Washington, D.C.: February 2024).

[58]National Academies, *Consensus Report: Wind Turbine Generator Impacts to Marine Vessel Radar* (Washington, D.C.: 2022).

[59]Various agencies rely on radar to achieve their missions. For example, NOAA and the Coast Guard use high-frequency radar systems to track ocean currents to aid in oil spill responses and search and rescue activities. DOD, Department of Homeland Security, and Federal Aviation Administration use long-range radar systems to conduct air surveillance. Other stakeholders, such as recreational and commercial fishermen and shipping vessel pilots, use marine vessel radar to navigate.

from consideration for wind energy activities if the agency identifies critical impacts that cannot be mitigated. DOD also has agreements with lessees to temporarily curtail operations if needed. In addition, NOAA and researchers from Woods Hole Oceanographic Institute are developing software to reduce interference. There is also ongoing research on radar software and systems and infill radar, or smaller radar systems placed within an offshore wind farm, to further mitigate impacts, according to one expert.

Offshore Wind Turbines Could Have a Variety of Impacts on Maritime Navigation and Safety

Offshore wind arrays constructed close to existing shipping lanes may increase the risk of vessels colliding with offshore wind infrastructure or other vessels, according to experts we interviewed and documents we reviewed. For example, one expert told us that large shipping vessels may have trouble avoiding turbines in the event of a mechanical failure due to the wide turning radius—a large shipping vessel may need up to 2 nautical miles to properly maneuver. The expert also said that wind turbines may obscure smaller vessels on radar, and when smaller vessels emerge from an offshore wind farm, a large shipping vessel may not have enough time to avoid a collision. In addition, two fisheries stakeholders expressed concerns that turbines could affect search and rescue operations in or around turbines. For example, aircraft conducting search and rescue missions may not be able to fly as low to the water because of turbine heights, according to Coast Guard officials. However, one Coast Guard official told us that offshore wind turbines, similar to radio towers, are one of many factors considered when planning for search and rescue. Coast Guard officials also said wind turbines may affect the accuracy of water current models used to predict vessel or person movement, but they are working on new models to address this challenge. Some of these navigation and safety impacts can be mitigated by limits on construction and siting, such as ensuring minimum distances between shipping lanes and wind turbines.

BOEM's Oversight of Offshore Wind Development Includes Coordination with Agencies, Tribes, and Stakeholders to Address Impacts, but Opportunities for Improvement Exist

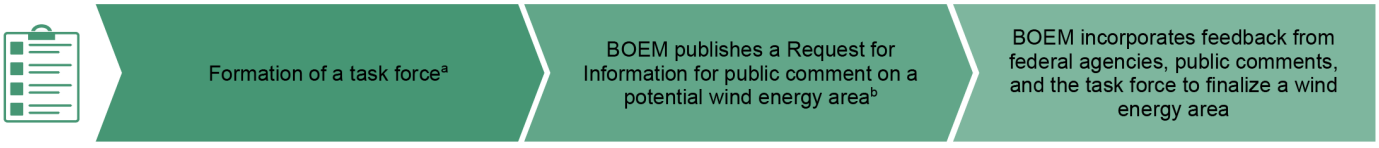
BOEM—and later in the process BSEE—oversees offshore wind energy development through a multi-year permitting process, including coordination with other federal agencies and stakeholders to identify lease areas and obtain information to identify and mitigate potential impacts. However, several gaps exist in BOEM's process for ensuring adequate consultation with Tribes and engagement with fisheries. In addition, opportunities exist for BOEM and BSEE to improve enforcement of community engagement, increase capacity, and establish data sharing requirements.

BOEM's Permitting Process Includes Coordination with Multiple Agencies and Stakeholders to Identify and Mitigate Potential Impacts

Throughout the offshore wind permitting process, BOEM obtains input from multiple federal agencies, state governments, Tribes, and other stakeholders to identify and mitigate potential impacts of offshore wind energy projects.[60] BOEM's process also requires lessees to report on monitoring of impacts, mitigation strategies, and plans for stakeholder engagement.

Planning and Analysis. The Planning and Analysis phase of the offshore wind energy permitting process, as outlined in figure 4, typically begins with BOEM forming a task force, either at the request of a state governor or at BOEM's discretion. BOEM then publishes a Request for Information for public comment on the potential lease area to inform its definition of a final wind energy area.

Figure 4: Bureau of Ocean Energy Management (BOEM) Offshore Wind Energy Permitting Process—Planning and Analysis Phase



Source: GAO analysis of Bureau of Ocean Energy Management processes; GAO (icon). | GAO-25-106998

[a]A task force may be composed of representatives invited from federal agencies, as well as those of affected states, federally recognized Tribes, and local governments. State agency representatives

[60]BOEM documents its compliance with NEPA at the various agency decision points in this process of offshore wind development. As previously noted, that may take the form of an EIS, an environmental assessment, or other documentation, depending on the anticipated effects of the proposed action.

can include, but are not limited to, officials from public utilities, environmental protection agencies, port authorities, and state historic preservation offices.

[b]BOEM requests information through public comments, including information on existing uses of the proposed areas; potentially affected archaeological sites; geological conditions; and other socioeconomic, biological, and environmental information for the proposed area. BOEM also issues a Call for Nominations to the public to gauge developer interest and a Notice of Intent to Conduct an Environmental Assessment, on which the public may also comment.

Task force meetings provide BOEM and those invited representatives a forum to exchange information on a specific offshore wind project, according to BOEM guidance. For example, entities like DOD and NOAA Fisheries participate in such task forces and can identify and recommend areas to avoid based on national defense needs or the location of essential fish habitats, respectively. A task force can continue to provide feedback to BOEM throughout all phases of the permitting process. The public comment period is one of a few required points during the permitting process where the public, Tribes, and other affected stakeholders, such as fishing and shipping industry representatives, can provide feedback on potential impacts and concerns to BOEM. BOEM must respond to the submitted comments.[61]

Leasing. During the Leasing phase, BOEM reviews preliminary financial information from interested developers to review eligibility. BOEM then holds an auction to offer a commercial lease located in the identified wind energy area.[62] BOEM forwards the winning bid to the Department of Justice for an antitrust review and publishes the preliminary auction results on its website. Lessees sign lease agreements with BOEM, which can include stipulations like the development of communication and engagement plans for affected Tribes, communities, and stakeholders.[63]

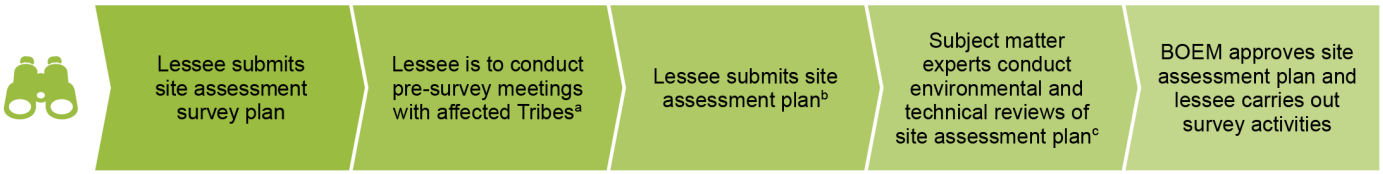
Site Assessment. The Site Assessment phase, as shown in figure 5, requires the winning lessee to submit a survey plan to BOEM that details the company's plans and timelines to survey the lease area for environmental, technical, and other potential impacts.

[61]There are several other points throughout the permitting process where BOEM engages with affected stakeholders, such as during public meetings regarding proposed call areas.

[62]Since May 2022, BOEM has considered a combination of monetary bids and bidding credits, such as financial contributions to workforce training programs, to determine the outcome of an auction.

[63]Lease agreements contain extensive requirements for lessees, including but not limited to financial assurances in the event of early decommission, detailed progress reports, and mitigation efforts for endangered and protected species.

Figure 5: Bureau of Ocean Energy Management (BOEM) Offshore Wind Energy Permitting Process—Site Assessment Phase



Source: GAO analysis of Bureau of Ocean Energy Management processes; GAO (icon). | GAO-25-106998

[a]BOEM provides guidance to lessees that recommends how to engage with stakeholders and Tribes. This pre-survey meeting is the only explicitly required meeting for lessees to conduct, according to BOEM's internal procedures.

[b]Site assessment plans include initial surveys and research activities necessary to characterize a lease site.

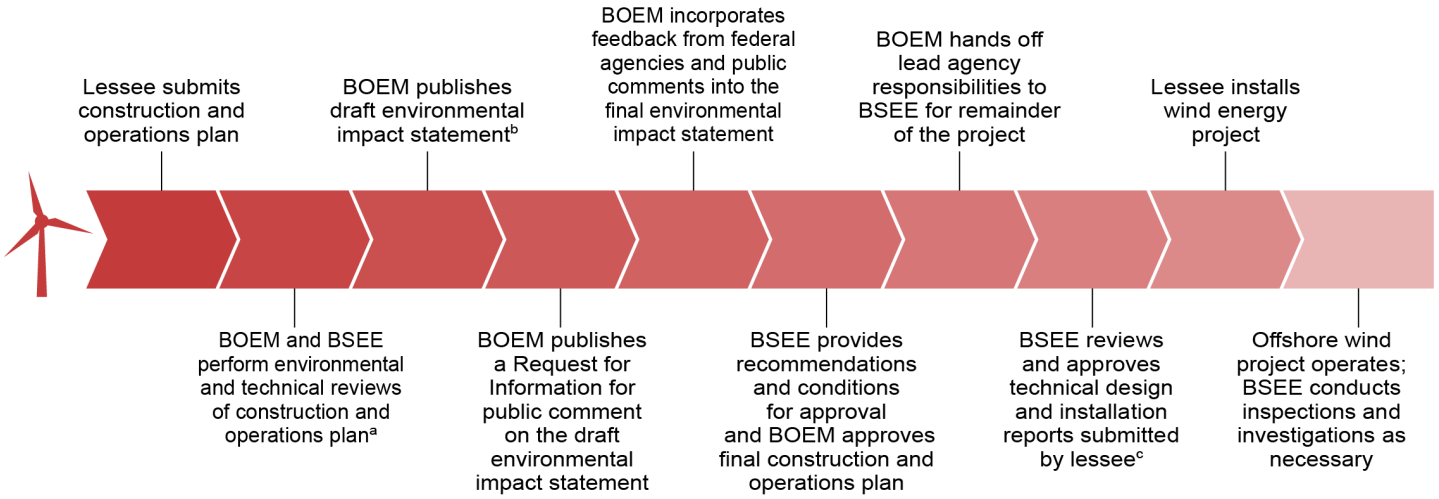
[c]Subject matter experts, such as geologists and engineers, from BOEM and BSEE conduct technical reviews to evaluate the proposed survey technology and methodology.

BOEM conducts environmental reviews of the site assessment plan in accordance with various statutes. For example, NEPA requires federal agencies like BOEM to evaluate and report on the environmental impacts of a project such as an offshore wind project.[64] Agency subject matter experts, such as officials from NOAA Fisheries and the Advisory Council on Historic Preservation, consult on reviews of the plans for potential impacts from survey activities and proposed mitigations. In addition, BOEM requires, both through lease stipulations and as part of the approval process for site assessment and other plans, that offshore wind project developers take steps to mitigate potential adverse environmental impacts. For example, BOEM has directed lessees to establish "acoustic exclusion zones" for geophysical sound surveys, so that active survey areas are clear of marine mammals and sea turtles. BOEM may also require monitoring in conjunction with NOAA. Protected species observers, third party officials who report to both BOEM and NOAA, look for marine mammals so that the possibility of vessel strikes is minimized.

Construction and Operations. During the Construction and Operations phase, as shown in figure 6, BOEM and BSEE review a construction and operations plan (COP) submitted by the lessee. During this phase, BOEM and BSEE perform environmental and technical reviews.

[64]Specifically, NEPA's evaluation and detailed statement requirements apply to "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C).

Figure 6: Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) Offshore Wind Energy Leasing Process—Construction and Operations Phase



Source: GAO analysis of Bureau of Ocean Energy Management processes; GAO (icon). | GAO-25-106998

[a]BOEM is the lead agency on environmental reviews, and BSEE leads some technical reviews. Technical reviews include data quality and site characterization analysis.

[b]BOEM and subject matter experts review, by law, the construction and operations plan (COP) to analyze environmental impacts from construction, operation, and decommission and the proposed mitigations.

[c]BSEE, along with BOEM, conducts a review of the fabrication design report and facility installation report to ensure consistency with the National Environmental Policy Act of 1969 requirements, consistency with the COP, and technical acceptability.

In accordance with NEPA, BOEM first publishes its environmental analysis in a draft EIS. Affected Tribes, stakeholders, and the public are invited to comment on the draft EIS. BOEM officials told us they incorporate this feedback as they deem appropriate into the final EIS.

BOEM officials told us the agency includes requirements in the COP approvals, such as revised communication and engagement plans. In addition, as part of the process for approvals of such plans, BOEM may direct lessees to implement mitigations during Construction and Operations. Table 3 includes examples of mitigations that BOEM may require of lessees, in coordination with other agencies.

Table 3: Examples of Planned or Implemented Strategies to Mitigate Offshore Wind Impacts

Potential impact	Mitigation
Marine life and ecosystems	
Acoustic disturbance	Bureau of Ocean Energy Management (BOEM) may require the lessee to • monitor operational noise and whale and fish vocalizations in the lease area before, during, and following construction; • submit a Marine Mammal and Sea Turtle Monitoring Plan for Pile Driving; • use bubble curtains to dampen pile driving sound; • pause operations if protected species are sighted; and • limit piledriving to months outside of likely whale migration. National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service released draft technical guidance on the effects of human-made sound on marine mammals that establishes noise thresholds such as for offshore survey and construction activities.[a]
Vessel strike	BOEM may require the lessee to submit a Vessel Strike Avoidance Plan and take several precautions to minimize strike risk to protected species, such as complying with speed restrictions and employing observers to monitor and report marine mammal activity.
Entanglement risk	BOEM may require that lessees monitor the risk of secondary entanglement from expected increases in fishing around fixed-bottom turbine foundations by annually surveying at least 10 of the turbines located closest to shore.
Collision risk to birds and bats	BOEM may require the lessee to install bird perching-deterrent devices on each turbine, where possible. Prior to or concurrent with offshore construction activities, BOEM may require the lessee to submit an Avian and Bat Post-Construction Monitoring Plan for BOEM, Bureau of Safety and Environmental Enforcement (BSEE), and U.S. Fish and Wildlife Service review.
Fishing industry	In January 2025, BOEM finalized guidelines that provide recommendations to lessees on the mitigation of impacts to fishing, including compensation for losses to commercial and recreational fisheries.[b]
Fishery surveys	NOAA is coordinating with BOEM and lessees to deploy a northeast Atlantic regional survey mitigation strategy to address the potential impacts to its ability to conduct fisheries surveys within wind arrays.[c]
Economic and community impacts	BOEM has included bidding incentives for lessees to invest locally, which can include developing a local workforce. For example, one lessee was required, per the lease agreement, to provide approximately $20 million for local workforce training programs or developing a domestic supply chain (e.g., local assembly or manufacture of turbine components).
Tribal resources	Tribes may be invited to participate in task forces and therefore provide feedback to BOEM throughout the permitting process. Starting in 2022, with leases in the New York Bight and Carolina Long Bay, BOEM included stipulations that lessees develop a Native American Tribes Communications Plan. BOEM issued draft guidelines for these plans in February 2023 that include descriptions of the types of information and outreach lessees should conduct with Tribes.

Potential impact	Mitigation
Defense and radar systems	Early coordination between BOEM and the Department of Defense (DOD) has resulted in avoiding defense-critical areas. For example, in 2017, DOD provided a wind energy compatibility assessment in support of BOEM's efforts to establish wind energy areas in the New York Bight. BOEM continued to work with DOD's Military Aviation and Installation Assurance Siting Clearinghouse to deconflict existing and future activities identified by DOD, particularly the Department of the Navy training exercises. Prior to commencing construction, BOEM may require the lessee to establish a communications plan in coordination with the U.S. Fleet Forces Command and the Naval Air Warfare Center Aircraft Division concerning construction activities with the potential to impact military activities. Prior to operation, BOEM may require that the lessee notify various radar operators and users of radar data (e.g., NOAA, United States Coast Guard, and various DOD entities) to coordinate mitigation of adverse radar impacts. BOEM may also require that lessees submit documentation demonstrating how it will mitigate unacceptable interference with oceanographic high-frequency radar systems.
Marine navigation and safety	BOEM, in consultation with the Coast Guard, can prohibit construction within a certain distance of shipping lanes. In addition, BOEM may require lessees to provide a lighting, marking, and signaling plan for review by BOEM, BSEE, and the Coast Guard at least 120 days before installing turbine foundations. BOEM may also require lessees to coordinate on maritime safety and security issues, including notifying BSEE and the Coast Guard of any relevant events or incidents and providing the Coast Guard with environmental data, imagery, communications, and other information pertinent to search and rescue or marine pollution response.

Source: GAO review of lease documents and expert testimony. | GAO-25-106998

[a]National Oceanic and Atmospheric Administration, *National Marine Fisheries Service, 2024 Updated Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing—Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts* (Washington D.C.: October 2024).

[b]BOEM, *Guidelines for Providing Information for Mitigating Impacts to Commercial and For-Hire Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR Part 585* (Washington, D.C.: January 2025).

[c]NOAA officials told us they are currently developing regional strategies to mitigate impacts on surveys for the southern Atlantic and the area formerly known as the Gulf of Mexico, as well as for the Pacific coast.

Following BOEM's approval of the COP, BOEM hands off lead agency duties to BSEE. During Construction and Operations, BSEE oversees the implementation and maintenance of safety management plans developed by the lessee. BSEE also monitors the lessee's management and evaluation of structural integrity and critical safety systems to ensure that the facilities are responsibly maintained for the operational life of the lease. The agency may conduct scheduled and unscheduled inspections to determine whether the lessee is in compliance with laws, regulations, and the terms and conditions of the lease, among other things. BSEE may also conduct investigations if an incident (such as a fire), injury, or fatality occurs. The agency may also take enforcement action, such as issuing noncompliance notices, cessation orders, suspension of operations, and certain lease suspensions, if necessary.

Bureau of Safety and Environmental Enforcement (BSEE) Blade Failure Investigation

In July 2024, a blade failure on one turbine at the Vineyard Wind project—under construction about 15 miles off the coast of Martha's Vineyard, Massachusetts—caused one of three turbine blades to break off. Debris, consisting primarily of foam insulation and fiberglass pieces, washed up on local beaches. Local communities expressed concern about the potential impacts of the debris to the environment, marine life, and human health.

BSEE sent a team to investigate the incident, according to officials. BSEE called for Vineyard Wind to cease power production and construction and conduct a risk analysis for personnel working in the area.

One month following the failure, BSEE allowed Vineyard Wind to resume installation of turbine towers and nacelles and subsequently called for an analysis of the environmental harm caused by the blade failure.

Vineyard Wind conducted debris removal following the blade failure, which the manufacturer attributed to a manufacturing flaw.

As of January 2025, BSEE's investigation is ongoing, and an after-investigation report should be publicly available within 1 year of the incident, according to BSEE officials.

Source: GAO analysis of BSEE information. | GAO-25-106998

Decommissioning. During the Decommissioning phase, BSEE reviews and approves the decommissioning application. This should include, by law, a review of potential environmental impacts resulting from decommissioning activities. BSEE would, as necessary, conduct oversight and take enforcement action, as well as verify that the site has been cleared.

BOEM Has Taken Steps to Address Gaps in Its Tribal Engagement, but Concerns Remain About Meaningful Consultation and Capacity Building

During initial planning of wind energy areas and when establishing wind lease areas, BOEM has taken steps to incorporate tribal input but has not consistently engaged in meaningful consultation, according to Tribes. Furthermore, consultation between BOEM and Tribes on wind development has been limited by Tribes' capacity issues and limitations in BOEM and BSEE's statutory ability to provide adequate support for capacity building.

Inconsistent Tribal Consultation

BOEM has not consistently engaged in meaningful consultation with Tribes during the offshore wind energy development process as called for in directives and guidance for tribal consultation. Representatives from most of the Tribes and tribal organizations we spoke with stated they have given input to BOEM at various points in the process, but their input was not addressed. Moreover, BOEM has not consistently demonstrated whether and how it has incorporated tribal feedback into its decisions. For example, in earlier tribal consultation reports, BOEM detailed how it invited many Tribes to consult, but did not describe how, if at all, it incorporated comments from Tribes or what constituted formal and informal consultation, as required. Furthermore, according to one expert

and nearly all the Tribes we spoke to, shortcomings in BOEM's consultation efforts included challenges with the following.

- **Timing of coordination.** In some cases, tribal representatives told us that coordination occurred after BOEM had made decisions about where it established wind energy areas, too late for BOEM to incorporate input from Tribes. For example, one tribal official told us BOEM did not contact their Tribe until after the relevant lease was awarded. Representatives from many Tribes told us that BOEM is treating consultation as a "box-checking exercise," and it was not clear how, if at all, their comments would affect the lease location or terms and conditions. In some cases, tribal representatives told us that BOEM's outreach was limited to notifying Tribes via letter or email and presenting information at public meetings. BOEM officials told us that Tribes have not always had the opportunity to give feedback on wind energy area identification due to tight time frames.
- **Incorporation of tribal feedback.** Many tribal representatives told us that BOEM is not adequately incorporating feedback from consultations and outreach about culturally significant sites into its decisions. Specifically, some tribal representatives stated that, when identifying leasing areas, BOEM focused on physical artifacts assessed by archaeologists and technicians that may not be familiar with tribal traditions and oral history related to certain offshore areas. Moreover, some tribal representatives raised concerns that lessees were not qualified to take appropriate care when surveying submerged lands during Site Assessment. BOEM annual tribal consultation reports indicated they received tribal officials' concerns, but BOEM project documentation does not consistently reflect whether the agency took efforts to consider or address these concerns.[65]
- **Recognition of impacts to fishing areas, including some areas protected by treaty.** Several tribal representatives told us that BOEM has not adequately addressed their concerns about impacts to their established fishing areas, some of which are protected by treaties and require co-management by the Tribes and federal government. Representatives from one Tribe warned of the possibility of their

[65]BOEM officials cited their Section 106 consultation process specifically related to ancient submerged landform features, including where such consultations affected the final EIS. However, several tribal officials told us that these consultations occurred too late to avoid disturbing some potentially significant sites. Officials also stated that BOEM plans to establish a section in future project EISs to specifically address tribal rights and interests. They said a template for the proposed section will be coordinated with Tribal Nations for consideration for inclusion in upcoming leases.

territorial fishing grounds becoming overcrowded, as boats that have been excluded from lease areas with floating wind turbines could move into their fishing grounds. Others said they raised concerns to BOEM but have seen no response or efforts to use tribal expertise through co-management of fishing grounds.[66]

Multiple sources of guidance and directives exist to guide BOEM's consultation with Tribes (see table 4).

Table 4: Selected Federal Guidance and Directives for Tribal Consultation

Source of guidance or directives	Key language
Executive Order 13175[a]	Each agency shall have an accountable process to ensure meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.
Section 106 of the National Historic Preservation Act of 1966[b]	Federal agencies must consult with designated representatives of Indian Tribes and Native Hawaiian organizations when agency-assisted "undertakings" may affect historic properties—including those to which Tribes attach religious or cultural significance—prior to the approval of the expenditure of federal funds or issuance of any licenses.[c]
Guidance for Federal Departments and Agencies on Indigenous Knowledge, Executive Office of the President[d]	Indigenous knowledge is a valid form of evidence for inclusion in federal policy, research, and decision making.
Joint Interior and USDA Secretarial Order on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters (Order 3403)[e]	The departments will consider tribal expertise or Indigenous knowledge as part of federal decision-making relating to federal lands, particularly concerning management of resources subject to reserved tribal treaty rights and subsistence uses. The departments will endeavor to engage in co-stewardship where federal lands or waters, including wildlife and its habitat, are located within or adjacent to a federally recognized Indian Tribe's reservation, where federally recognized Indian Tribes have subsistence or other rights or interests in non-adjacent federal lands or waters, or where requested by a federally recognized Indian Tribe.

[66]BOEM officials stated that the agency is making efforts through cooperative agreements and research studies to co-steward offshore areas. In addition, BOEM has included lease stipulations to mitigate impacts to Indigenous subsistence fishing in the Gulf of Maine lease.

Source of guidance or directives	Key language
Interior Departmental Manual: Intergovernmental Relations, Part 512[f]	Bureaus and offices are to develop a report of the results of their consultations with Tribes. Reporting is intended to be a comprehensive list of all consultation efforts undertaken that year and may include, but is not limited to, the scope, cost, and activities of the consultation efforts. The bureau or office may also include consultation efforts conducted one-on-one with Tribes to highlight successes, challenges, or best practices. Providing notification to one or more Tribes of a departmental action as a stand-alone effort is not consultation. On completion of the consultation period, Bureau of Ocean Energy Management (BOEM) must prepare and transmit to the Tribe (or for national and regional consultations, or, if appropriate, publish on the website) documentation in a record of consultation that describes (1) a summary of tribal input received; (2) an explanation of how that tribal input was addressed; and (3) the reasoning for any instance in which tribal suggestions were not incorporated into the departmental action or consensus could not be attained.
BOEM *Tribal Consultation Guidance*[g]	Guidance specifies that tribal consultation should be early, meaningful, and individualized.

Source: GAO analysis of federal tribal consultation criteria. | GAO-24-106998

[a]Executive Order 13175 of Nov. 6, 2000, Consultation and Coordination with Indian Tribal Governments, 65 Fed. Reg. 62749 (Nov. 9, 2000).

[b]Pub. L. No. 89-665, § 106, 80 Stat. 915, 917 (codified as amended at 54 U.S.C. § 306108).

[c]54 U.S.C. §§ 306102(b)(4), 306108; 36 C.F.R. §§ 800.1–800.13.

[d]Executive Office of the President, Guidance for Federal Departments and Agencies on Indigenous Knowledge (Washington, D.C.: November 2022).

[e]Department of the Interior; Department of Agriculture, *Joint Secretarial Order on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters*, Order No. 3403 (Washington, D.C.: November 2021; amended November 30, 2022).

[f]Department of the Interior, *Departmental Manual: Intergovernmental Relations*, Part 512, chapters 4 and 5 (Washington D.C.: November 2022).

[g]Bureau of Ocean Energy Management, *Memorandum: Tribal Consultation Guidance* (Washington, D.C.: December 2024). The guidance was first issued in 2014 and subsequently updated in 2018 and 2024.

Despite existing directives and guidance, BOEM's consultation has been inconsistent and has not effectively considered tribal expertise and input during the consultation process. According to some tribal representatives, BOEM may have established wind energy leases in areas of cultural significance or in areas that could affect tribal fishing grounds, despite input from Tribes about the consequences of development in these areas. BOEM officials acknowledged that its consultation with Tribes needs improvement, stating that the agency is understaffed and is working to fill more positions in areas where Tribes are affected. Agency officials stated that BOEM's consultation efforts—and demonstration of those efforts by the agency—have improved with the most recent leases. Specifically, they pointed to final lease sale notices in the Gulf of Maine and California that have improved upon past consultation efforts.

However, while these more recent lease sale notices contain more discussion of Tribes' concerns, they do not describe how, if at all, BOEM incorporated comments from Tribes. Rather, these documents generally state that BOEM conducted "extensive consultation and engagement with Tribes" affected by areas offered for leasing and included new lease requirements for lessee tribal engagement. BOEM officials told us that, in cases where Tribes shared concerns privately, it is more difficult to point to a public record demonstrating BOEM's consideration of the information. However, according to departmental guidance, BOEM should prepare annual tribal consultation reports that document efforts to contact Tribes; include or provide references to notes of meetings with Tribes; and summarize outcomes, including decisions made, actions planned or taken, and how tribal input was incorporated.

While BOEM has provided more detail in its recent reports, Tribes we spoke to in 2023 and 2024 said that consultation was inadequate, and a lack of trust persists. In addition, several tribal representatives reported that they never received a record of consultation from BOEM containing its reasoning for instances in which tribal suggestions were not incorporated or that consensus could not be attained, as called for in BOEM guidance. Furthermore, in its *Fiscal Year 2024 Tribal Consultation Report*, BOEM stated that it had executed six memorandums of agreement related to offshore wind projects with Tribes as signatories. Five of these memorandums were unsigned by the Tribes, and the remaining memorandum was not available for review as of December 2024. BOEM officials stated that they invited Tribes to sign, but they do not have to sign for the agreement to be executed.

In December 2024, BOEM released a strategy for tribal engagement that (1) includes goals for strengthening its consultation practices; (2) aligns its definition of tribal consultation with existing directives and guidance; and (3) directs BOEM staff to track progress, address gaps and needs, and identify new opportunities for engagement.[67] According to BOEM, it will use the strategy to ensure early and consistent outreach and engagement on BOEM activities with implications for Tribal Nations and Indigenous peoples. Specifically, the strategy calls for a Tribal Working Group, comprised of BOEM staff, to coordinate tribal, Native Hawaiian, and Indigenous peoples outreach, engagement, and consultation activities across the agency. The working group is to review and update

[67]Bureau of Ocean Energy Management, *Tribal Nation and Indigenous Peoples Engagement Strategy* (Washington, D.C.: Dec. 9, 2024).

the strategy document on an annual basis with assistance from the BOEM directorate, regional directors, and program directors to track progress, address gaps and needs, and identify new opportunities. It remains to be seen how BOEM will implement this strategy. As BOEM does so, clearly demonstrating and routinely reporting publicly on its progress would help ensure that it is adequately considering tribal concerns and building trust with potentially affected Tribes.

Limitations on Tribes' Capacity Building

Regardless of outreach efforts conducted by BOEM, representatives from nearly all Tribes and tribal organizations we spoke to said they lack the capacity to adequately review documents or meaningfully consult with government officials and developers. Moreover, according to agency officials, consultation between BOEM and Tribes on wind development has been hindered by statutory limitations in BOEM's ability to provide adequate support for Tribes' capacity building.[68] Specifically, BOEM officials told us that building tribal capacity is needed for meaningful consultation, but direct grants or cooperative agreements that the agencies can use to support capacity building require that Tribes match the funds provided, which is cost prohibitive for Tribes. BOEM's 2025 budget justification proposed changes to its appropriations language to remove the matching requirement for grants and cooperative agreements, but the legislation did not address the matching requirement.[69] BOEM has explored other capacity-building efforts, including a pilot in 2022 to provide contractor support to Tribes to help them review complex project documents.[70] However, until a statutory change is made that enables BOEM to build Tribes' capacity to adequately review documents and conduct meaningful consultation, tribal feedback and Indigenous knowledge may not be sufficiently incorporated into offshore wind

[68]In addition, BSEE officials told us the agency does not have the authority to issue grants to any entity but can provide direct financial assistance to Tribes via cooperative agreements. However, officials said that the statute does not explicitly name Tribes, creating some limitations on BSEE's authority to coordinate and consult with them.

[69]Continuing Appropriations and Extensions Act, 2025, Pub. L. No. 118-83, 138 Stat. 1524 (2024); Full-Year Continuing Appropriations and Extensions Act, 2025, Pub. L. No. 119-4, __ Stat. __ (2025).

[70]BOEM officials could not say whether, or to what extent, it would expand such a pilot. In addition, some tribal officials told us there was minimal participation due to a lack of funding and trust in using BOEM contractors to review BOEM documents. In November 2024, BSEE officials said they were exploring the use of funding appropriated for a study authorized in the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 to, among other things, outline recommendations for governmental consideration of all coastal communities affected by offshore wind development, particularly tribal governments and fisheries.

development decisions. In the meantime, leases are moving forward without ensuring consideration of Tribes' culturally significant sites.

BOEM Has Addressed Some Gaps in Its Process for Addressing Potential Impacts to Fisheries, but Stakeholder Concerns Remain

BOEM has taken steps to inform industry stakeholders about its process and efforts to incorporate industry input when establishing a lease area. However, stakeholders remain concerned that BOEM has not adequately considered or addressed the concerns of the commercial fishing industry and fisheries management councils at that stage of the permitting process. BOEM considers competing uses of the areas under consideration for offshore wind development, including commercial fishing.[71] While BOEM has met with fishing industry representatives during the process of establishing lease areas, fisheries stakeholders said they viewed BOEM's responses and how they addressed input as unclear or insufficient.

For example, fisheries stakeholders have raised concerns that lease areas, once established, will limit or exclude certain fishing activities. Some experts and fisheries stakeholders told us that BOEM listens to their concerns but proceeds with lease sales without addressing them. In more recent documents in the Gulf of Maine and in the New York Bight, BOEM discussed the rationale for excluding certain areas in the final lease sale notice and in area identification memos. These rationales included avoiding fishing grounds like scallop beds. Moreover, officials said that, for more recent lease areas, they gave presentations on their decisions at task force meetings. However, according to BOEM task force meeting rosters and the agency's procedures for task force formation, fisheries stakeholders are not invited to these meetings.[72] Hence, it is not clear how BOEM ensures that these stakeholders are consistently included in the process and informed of BOEM's efforts to incorporate input from the industry when establishing lease areas. Moreover,

[71]The Outer Continental Shelf Lands Act and other statutes require BOEM to consider competing uses of the areas it evaluates for leasing and development. Specifically, the act requires the Secretary of the Interior to ensure that any activity is carried out in a manner that provides for consideration of any other use of the sea or seabed, including use for a fishery. 43 U.S.C. § 1337(p)(4)(J)(ii). In addition, agencies are charged under NEPA to assess the environmental impacts of their actions, including, when preparing an EIS, to analyze interrelated social and economic effects. Such effects would include impacts to the commercial and recreational fishing industries resulting from the approval of construction and operations plans. In this case, consideration entails analyzing the environmental impacts of a proposed offshore wind project and reasonable alternatives to the proposed project, including a no-action plan, as discussed above. The analysis must include support for mitigation measures.

[72]BOEM officials told us that non-governmental fisheries stakeholders are not eligible to be members of task forces for legal reasons, but they may attend task force meetings.

representatives from the fishing industry and fishery management councils shared similar concerns as Tribes with respect to the adequacy of BOEM's outreach, its treatment of their concerns, and their capacity to review and comment on lease documents.

In addition, gaps exist in BOEM's process for determining how offshore wind project developers will mitigate potential impacts to fishing industry operations through compensation to these operators and ensuring that adequate compensation occurs. As part of the COP approval, BOEM requires lessees to mitigate impacts to fisheries on a project-by-project basis. In its June 2022 draft guidelines for mitigating impacts to fisheries, BOEM lays out how lessees are to mitigate impacts and recommends that lessees establish a compensation process.[73] However, experts, fisheries stakeholders, and state officials told us that the compensation process is unclear. For example, in situations where fishing boats operate in a state that is different than their port, there are concerns about their eligibility for compensation. For the Atlantic region, BOEM officials said they hoped the 11-state Fisheries Mitigation Project's regional approach would result in a framework for compensation that could cross state lines. However, as of November 2024, the 11-state Fisheries Mitigation Project was still in development and procedures for applying for compensation have not been established. Furthermore, challenges have arisen from BOEM not finalizing the guidelines. For example, officials from one state told us that one lessee did not want to implement BOEM's draft compensation guidelines, a reluctance directly related to unsettled guidelines. BOEM finalized these guidelines in January 2025. It remains to be seen how this final guidance will affect compensation for projects already underway.

In a 2019 memorandum of understanding with NOAA and the Responsible Offshore Development Alliance, BOEM committed to explore collaborations on various issues, including identifying the most effective ways to bring fishing industry expertise and innovation into planning and

[73]In June 2022, BOEM released draft *Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf*, which it finalized in January 2025. Over 10 years ago, to address future potential conflicts between fishing and wind projects, BOEM sought input from commercial and recreational fishing industries, as well as fisheries management agencies and scientists, to develop reasonable best management practices and mitigation measures. BOEM identified best management practices that contain proposed mitigation measures developed for reducing conflict with the fishing community. According to BOEM, these mitigation measures and best management practices would be considered by BOEM for inclusion in future NEPA documents and as conditions in leases. Bureau of Ocean Energy Management, *Final Report on Best Management Practices and Mitigation Measures* (Washington, D.C.: July 2014).

development processes. Moreover, *Standards for Internal Control in the Federal Government* state that agency management should use quality information to achieve its objectives, including externally communicating necessary quality information.[74] However, BOEM has not clarified how it incorporates input from the industry to avoid, minimize, or mitigate impacts when establishing lease areas. Moreover, BOEM's process does not ensure the agency demonstrates how it has considered input from fishery stakeholders. As a result, lease sales could proceed without BOEM demonstrating full consideration of impacts to fisheries and how it will ensure developers address impacts to the fishing industry.

BOEM and BSEE Have Not Established Guidance for Lessees' Communication and Engagement Plans with Stakeholders or a Plan for Enforcement

BOEM and BSEE have not established guidance for lessee communication and engagement plans and do not have a plan to monitor implementation of these plans. Starting in 2022 with projects in the New York Bight, lease terms require that the lessees create and adhere to communication and engagement plans for affected communities and stakeholders. According to BOEM, these lease stipulations require lessees to develop communication and engagement plans after a lease sale. These plans are intended to guide and inform lessee interactions with communities through the Site Assessment phase. However, BOEM has not established specific guidance for the contents of these communication and engagement plans.[75] BOEM officials said that, because there are so many different stakeholders, community engagement cannot be addressed through a single guidance document. In addition, lease terms also do not have detailed requirements, roles, and responsibilities for lessees' communication and engagement with affected communities as projects move into Construction and Operations. BOEM and BSEE also have not specified what enforcement actions, if any, they would take if a lessee does not fulfill its obligations. *Standards for Internal Control in the Federal Government* state that agency management should define objectives clearly and in specific, measurable terms so that performance toward achieving those objectives can be assessed.[76]

[74]GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G (Washington, D.C.: Sept. 10, 2014).

[75]BOEM guidance calls for the lessee to summarize stakeholder engagement that lessees used to consider, select, and eliminate project layout and design options. BOEM officials told us that they provide suggestions for engagement and the Department of the Interior has a checklist that can be used as guidance, but they said they do not know what the appropriate role is for BOEM to ensure proper behavior.

[76]GAO-14-704G.

In addition, BOEM and BSEE have not clarified their roles and responsibilities for monitoring implementation and enforcing lessees' use of communication and engagement plans. Specifically, some BOEM officials told us that it was BSEE's responsibility to enforce implementation of the plans, while BSEE officials stated the content and enforcement of the plan was BOEM's responsibility. Leading practices for interagency collaboration include that collaborating agencies should work together to define and agree on their respective roles and responsibilities, including how the collaborative effort will be led.[77]

BOEM officials told us they have an opportunity to evaluate lessee communication and engagement plans when evaluating the COP, incorporating new information from that evaluation into the terms and conditions to provide an updated framework for lessees to better engage with affected communities. However, they said BOEM has not implemented this in practice yet because none of the current leases with communication and engagement stipulations have reached the COP approval phase. Without implementing guidance and clarifying BOEM and BSEE's roles in monitoring and enforcement, the agencies cannot ensure that they are fulfilling their oversight responsibilities or that lessees are effectively engaging with—and mitigating impacts to—affected communities, such as historically disadvantaged communities.

BOEM and BSEE Have Not Taken Steps to Ensure They Have the Resources in Place for Effective Oversight and Engagement with Stakeholders

As development of offshore wind has increased, BOEM and BSEE have not taken all necessary steps to ensure that they have the resources in place to conduct effective oversight and engagement with stakeholders. Specifically, neither agency has a physical presence in the north Atlantic region, where offshore wind construction is underway.[78] This has made it difficult for the agency to bring in the employees with the most expertise in conducting impact assessments in some cases, according to agency officials and some developers. In addition, agency officials, fisheries stakeholders, tribal representatives, and state officials told us that BOEM and BSEE do not have the personnel or infrastructure required to fully engage with communities. This has limited BOEM's ability to ensure full

[77]GAO, *Government Performance Management: Leading Practices to Enhance Interagency Collaboration and Address Crosscutting Challenges*, GAO-23-105520 (Washington, D.C.: May 24, 2023).

[78]In contrast to both agencies having physical offices in the Pacific region and the area formerly known as the Gulf of Mexico, neither BOEM nor BSEE has an office dedicated to the North Atlantic region. Instead, they operate out of Interior's Washington, DC headquarters and the agency headquarters in Sterling, VA, respectively.

consideration of the impacts to some stakeholders and that communities understand the permitting process and how to effectively engage in it.

Furthermore, although BOEM is the lead agency, NOAA and Coast Guard officials told us they have had to take the lead in responding to community concerns in some cases, a task that is outside of their mission and capabilities. They had to do so because BOEM did not have a physical presence in the region. Also, while projects are not mature enough to fully evaluate BSEE's oversight efforts, officials said that, as more projects become operational, their current staff levels and infrastructure are likely to present challenges.

BOEM and BSEE officials told us they are undertaking efforts to build their capacity to oversee development of offshore wind energy. Specifically, BOEM and BSEE officials are creating additional staff positions in areas where additional capacity is needed, including tribal and community outreach. However, officials from both agencies stated that operating out of headquarters, as opposed to a dedicated Atlantic regional office, has limited their ability to align staff to the mission and to recruit additional staff. Both agencies have taken some steps to establish a physical Atlantic regional office to better oversee offshore wind energy development. The process includes changes to Interior's Departmental Manual and approvals that will need to be facilitated through Congress and Interior. Specifically, in September 2024, BOEM received approval from Congress to establish this regional office. In December 2024, it announced a director position. However, the agency has yet to take the remaining steps to establish a physical office to oversee development in the North Atlantic region. BSEE's budget request included funding for the new office, but officials told us they had put the process on hold because it was an election year and because procedures were still under development.

Standards for Internal Control in the Federal Government state that agency management should establish an organizational structure to achieve the entity's objectives, including consideration of responsibilities to external stakeholders that allow the entity to both communicate and receive information from external stakeholders. Without taking steps to ensure they have sufficient resources to oversee development in the North Atlantic region, including by establishing a physical office there, BOEM and BSEE cannot ensure that they can effectively address potential impacts, engage with stakeholders, and oversee implementation of lease requirements.

BOEM's Oversight Does Not Include Clear Requirements for Environmental Monitoring and Data Sharing That Could Inform Understanding of Regional Impacts

BOEM does not have specific guidance for environmental impact monitoring practices and data sharing at the regional level. Under current BOEM guidance and lease requirements, lessees conduct species monitoring to determine habitat changes for individual lease areas. But these efforts are not coordinated across other projects in a way that could be used to assess regional impacts. For example, one expert told us that, by standardizing data collection and sharing data across projects, researchers could better monitor changes in a region over time. Furthermore, some researchers and fisheries managers stated that species data collected by developers are not shared with the scientific community in a timely manner and sometimes not shared at all.

As of December 2024, BOEM had not provided guidance, requirements, or recommendations to lessees for how to conduct data collection during species monitoring to ensure that collection methods and organization support information sharing. In addition, BOEM does not require developers to share specific, standardized forms of monitoring data in the lease terms and conditions. BOEM officials told us they plan to work with NOAA to identify ways to standardize data collection and explore options for requiring data sharing beyond summary reports they currently require. Specifically, they said that they are looking to plan efforts with the National Renewable Energy Laboratory, Regional Wildlife Science Collaborative, and industry stakeholders to develop data collection guidance for fiscal year 2026.[79] As part of this effort, BOEM officials said they plan to identify datasets that are not business sensitive and determine whether they could require lessees to share that information with fisheries researchers and management.

While BOEM plans to take actions to standardize data collection and require data sharing, challenges exist to doing so, according to BOEM officials and some experts we spoke to. Specifically, BOEM would have to work with stakeholders to determine the level of data collection that would work best for species and environmental monitoring and research purposes. Furthermore, BOEM officials told us that lessees publish summaries of their data online, but researchers need access to the raw data to inform existing and potential research. However, these officials told us that it is expensive and time-consuming for developers to perform

[79]In October 2024, BOEM announced the POWERON Acoustic Monitoring Program, an initiative aimed at ensuring standardized collection, processing, and archiving of marine acoustic data for offshore wind lease areas.

quality control activities on these raw datasets to make them useful and avoid releasing sensitive information (e.g., locations of shipwrecks).

Leading practices for interagency collaboration call for agencies to ensure they have negotiated data and information-sharing arrangements that can be leveraged to help establish goals and monitor progress, among other shared activities.[80] Until BOEM establishes data collection and sharing standards for lessees, researchers' and fisheries managers' ability to analyze regional impacts of multiple projects will remain limited.

Conclusions

As the U.S. develops offshore wind energy in the U.S. Outer Continental Shelf, BOEM and BSEE play a critical role in ensuring such development occurs equitably and fully considers potential impacts to the environment, economy, and communities. To improve its efforts to consult with Tribes during the permitting process, BOEM should clearly demonstrate how it is implementing its December 2024 tribal engagement strategy to ensure early and consistent outreach and engagement, incorporation of tribal feedback, and accountability through the process. Doing so would avoid establishing leases in areas of cultural significance and ensure appropriate care with sacred sites. Moreover, for BOEM to provide adequate support for capacity building within Tribes to ensure consideration of Indigenous knowledge, congressional action is needed.

In addition, while BOEM has undertaken significant efforts to meet with representatives of the fishing industry, BOEM has not demonstrated how it has addressed their concerns when establishing lease areas. Without doing so, BOEM risks moving forward with leases without demonstrating full consideration of impacts to fisheries and how it will ensure developers address impacts to the fishing industry.

Furthermore, establishing clear guidance for lessees' communication and engagement plans—and BOEM and BSEE roles for monitoring these plans—would ensure that the agencies are fulfilling their oversight responsibilities. Such guidance would also help ensure that lessees are effectively engaging with, and mitigating impacts to, affected communities. In turn, steps remain to ensure that BOEM and BSEE have the resources in place in the North Atlantic region to conduct effective oversight and engagement with stakeholders.

[80]GAO-23-105520.

Finally, by providing guidance or an established plan for data collection and sharing as part of offshore wind leases, BOEM (in consultation with NOAA and industry) could improve analyses of regional impacts across multiple wind projects.

Matter for Congressional Consideration

Congress should consider amending language in legislation to address limitations in BOEM's authority to enable it to provide adequate support for capacity building for Tribes and tribal organizations that provide Indigenous expertise to the offshore wind leasing process. (Matter for Consideration 1)

Recommendations for Executive Action

We are making the following five recommendations to the Directors of BOEM and BSEE:

The BOEM Director should take steps to address gaps in its approach to tribal consultation, including clearly demonstrating and routinely reporting on its progress. This should include ensuring that annual tribal consultation reports clearly document decisions regarding tribal implications and preparing and submitting to Tribes a record of consultation that describes input and how it was addressed, as well as the reasoning for any instances in which input was not incorporated. (Recommendation 1)

The BOEM Director should take steps to ensure that it adequately demonstrates and publicly reports its consideration of fishing industry input. (Recommendation 2)

The BOEM and BSEE Directors should establish guidance for lessees with respect to lessees' communication and engagement plans, clearly define the agencies' respective roles and responsibilities, and develop a plan to monitor implementation of these plans. (Recommendation 3)

The BOEM and BSEE Directors should take steps to ensure that they have sufficient resources in place to oversee offshore wind energy development, including by establishing a physical office to oversee development in the North Atlantic region. (Recommendation 4)

The BOEM Director should develop guidance and specific requirements for lessees' data collection and sharing across offshore wind energy projects. (Recommendation 5)

Agency Comments

We provided a draft of this report to the Advisory Council on Historic Preservation, Commerce (NOAA), DOD, DOE, EPA, Department of

Homeland Security (Coast Guard), Interior (BOEM and BSEE), and the Marine Mammal Commission for review and comment. In its comments, reproduced in appendix III, Interior agreed with all five of our recommendations. The Advisory Council on Historic Preservation, EPA, Coast Guard, and Interior also provided technical comments, which we incorporated as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 4 days from the report date. At that time, we will send copies to the appropriate congressional committees, the Executive Director of the Advisory Council on Historic Preservation, the Secretary of Commerce, the Secretary of Defense, the Secretary of Energy, the EPA Administrator, the Secretary of Homeland Security, the Secretary of the Interior, the Executive Director of the Marine Mammal Commission, and other interested parties. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

If you or your staff have any questions about this report, please contact me at ruscof@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.

//SIGNED//

Frank Rusco
Director, Natural Resources and Environment

List of Requesters

The Honorable Bruce Westerman
Chairman
Committee on Natural Resources
House of Representatives

The Honorable Aaron Bean
House of Representatives

The Honorable Gus M. Bilirakis
House of Representatives

The Honorable Vern Buchanan
House of Representatives

The Honorable Kat Cammack
House of Representatives

The Honorable Mario Diaz-Balart
House of Representatives

The Honorable Byron Donalds
House of Representatives

The Honorable Neal Dunn
House of Representatives

The Honorable Scott Franklin
House of Representatives

The Honorable Carlos Gimenez
House of Representatives

The Honorable Andy Harris, M.D.
House of Representatives

The Honorable Laurel Lee
House of Representatives

The Honorable Anna P. Luna
House of Representatives

The Honorable Brian Mast
House of Representatives

The Honorable Cory Mills
House of Representatives

The Honorable John H. Rutherford
House of Representatives

The Honorable Maria Elvira Salazar
House of Representatives

The Honorable Chris Smith
House of Representatives

The Honorable W. Gregory Steube
House of Representatives

The Honorable Jeff Van Drew
House of Representatives

The Honorable Daniel Webster
House of Representatives

Appendix I: Objectives, Scope, and Methodology

This report describes (1) what is known about the potential impacts of offshore wind energy development; and (2) the mechanisms the Bureau of Ocean Energy Management (BOEM), in coordination with other agencies, has in place to oversee offshore wind energy development and to what extent they address potential impacts.

To examine both objectives, we reviewed various agency documentation related to federal management of potential offshore wind development impacts from lead agencies BOEM and Bureau of Safety and Environmental Enforcement (BSEE). This included documents such as environmental impact statements (EIS) for active offshore wind project leases, memorandums of understanding between BOEM and federal partners, BOEM Outer Continental Shelf studies, as well as additional published research findings, described below. We also interviewed officials from BOEM and BSEE as well as coordinating agencies, including National Oceanic and Atmospheric Administration (National Marine Fisheries and National Ocean Services), the United States Coast Guard, the Department of Defense, the Environmental Protection Agency, the Marine Mammal Commission, and the Advisory Council on Historic Preservation about potential impacts and their role in overseeing the offshore wind development and leasing process.

In addition, we interviewed representatives from a nongeneralizable sample of seven offshore wind developers with active or planned offshore wind projects in the U.S. about their involvement with the federal permitting process and their efforts to identify and address potential impacts. We selected these developers to cover offshore wind projects where permitting or operations were planned or underway. We also interviewed state agency officials from Maine, Massachusetts, and California about their involvement in the offshore wind development process and their views on potential impacts. We selected those states because of their involvement in planned and ongoing offshore wind development projects, including coordination with BOEM and BSEE on offshore wind oversight and decision-making as well as coordination with offshore wind developers on project development.

We spoke with representatives from 18 Tribes and four tribal organizations from the Atlantic and Pacific Coasts in individual meetings as well as listening sessions requested by two regional tribal organizations. During these listening sessions and meetings, we heard tribal representatives' views on potential impacts and federal oversight of the offshore wind development process, including concerns about federal consultation practices. We also met with representatives from three

individual Tribes to collect additional views about potential impacts, federal consultation, and oversight of offshore wind development. The views we obtained from tribal representatives cannot be generalized to all Tribes, but they provide examples of tribal perspectives and experiences on potential impacts and federal oversight of the offshore wind development process.[1] Based on concerns we heard from Tribes about federal tribal consultation practices, we reviewed agency documentation on tribal consultations, such as the BOEM Tribal Consultation Reports. We also reviewed documentation provided by some of the Tribes we spoke with about their interactions with BOEM and other federal agencies on offshore wind consultations, such as Tribes' formal comments during the offshore wind area identification and permitting processes and joint-tribal letters to BOEM detailing concerns about potential offshore wind development impacts and federal consultation practices. To assess the extent to which BOEM has met its consultation obligations to Tribes, we interviewed BOEM officials about its tribal consultation efforts and reviewed the agency's guidance and policies for tribal consultation.

We conducted two site visits to examine offshore wind construction and operations activities. We visited Virginia to examine the Coastal Virginia Offshore Wind project pilot turbines and offshore construction area. We visited Massachusetts to view the Vineyard Wind staging area in New Bedford, visit the Massachusetts Clean Energy Center Wind Testing Technology Center, and tour the National Offshore Wind Institute training facility. We selected these sites because they have ongoing offshore projects performing construction and operations activities. We also interviewed port authority officials, fishermen, and other stakeholders in New Bedford about offshore wind impacts to port operations and BOEM and BSEE oversight. In addition, we attended conferences covering the breadth of offshore wind-related issues, including potential impacts, current research, and federal oversight.[2]

To examine what is known about the potential impacts of offshore wind energy development, we reviewed scientific literature, BOEM scientific studies, academic research papers, and National Academies of Sciences,

[1]To characterize Tribes' views throughout this report, we defined modifiers to quantify the views of the representatives from the 22 Tribes and tribal organizations we interviewed as follows: "nearly all" indicates 19 to 21 Tribes or tribal organizations; "most" indicates 15 to 18; "many" indicates 10 to 14; "several" indicates five to nine; and "some" indicates two to four.

[2]Findings from our interviews and site visits with various stakeholders described here and below cannot be generalized to those we did not select and include in this report.

Engineering, and Medicine reports. We used these documents to identify categories of potential impacts and provide data, as appropriate. To gather current and relevant sources, we conducted a literature search through the GAO librarian to identify academic or other publications within the past 5 years that discuss potential impacts of offshore wind energy development, including scholarly and peer reviewed papers, conference papers, working papers, and publications from nonprofits, think tanks, and associations. The literature review returned 144 publications, which analysts independently reviewed and identified 59 publications relevant to our researchable objectives. We used this information to identify categories and examples of potential offshore wind impacts. We also interviewed a nongeneralizable sample of three non-government scientific research organizations specializing in offshore wind energy development to identify additional relevant documentation and discuss potential impacts, including the National Academies Ocean Studies Board, the Responsible Offshore Science Alliance, and the Regional Wildlife Science Collaborative. We selected these organizations because of their focus and expertise on offshore wind energy issues.

We contracted with the National Academies to identify a panel of experts to interview. The information we obtained through our expert interviews formed the basis of our findings on the potential impacts of offshore wind development. Specifically, we worked with the National Academies to identify experts to discuss a range of potential impacts, including environmental impacts, including impacts to marine life and habitat and oceanographic effects; marine safety and navigation, including impacts to shipping lanes and radar; defense, including impacts to security, training, and operations; historic and cultural sites; economic impacts, including impacts to fisheries and related industries, tourism and commercial activities, and industry and development; greenhouse gas emissions reduction; and other potential impacts, including human health and climate change.

We also wanted our panel of experts to include diverse participant backgrounds such as academia, think tanks, advocacy groups, and organizations such as fishing industry and maritime shipping and security groups. The National Academies initially identified a panel of experts representing expertise in the potential impact categories we specified and across various backgrounds. From this list, we considered the following factors to select our final list of experts: (1) the type and depth of relevant experience, (2) recognition in the professional community and relevance of any published work, (3) professional affiliations, (4) other relevant experts' recommendations, and (5) experts' willingness to meet with us.

To facilitate decisions on the final panel, the National Academies provided resumes, curriculum vitae, or other background information on potential invitees for our review before it extended invitations. The National Academies also collected information on potential conflicts-of-interest for our consideration and all experts signed conflict of interest forms before meeting with us. In consultation with the National Academies, we agreed on a final panel of 23 experts.[3]

In consultation with our research methodologists, we developed a semi-structured question set we used in each expert interview to identify potential impacts, knowledge gaps about those potential impacts, and recommendations for federal, state, and non-government entities to better understand and address potential impacts. We interviewed the 23 experts and conducted content analysis of their interviews to summarize their views and identify potential impacts and knowledge gaps to inform our findings (see appendix II for the list of experts interviewed). Not all experts could speak to every impact, and thus we note how many made certain statements throughout the report. In most cases, we relied on expert testimony to describe impacts; however, in some cases, we relied on work we identified through our literature review to illustrate a point.

In addition to interviewing experts identified by the National Academies, we interviewed representatives from several organizations and individuals about potential impacts of offshore wind energy development. In order to collect views on offshore wind impacts to fishing, we met with the four regional fisheries management councils with active offshore wind development or planned offshore wind lease areas, including the New England, the Mid-Atlantic, the area formerly known as the Gulf of Mexico, and the Pacific fishery management councils.[4] In addition, we interviewed stakeholder groups involved in offshore wind development, including four fishing industry stakeholders operating in Massachusetts, Maine, and

[3]We were not able to meet with the expert on potential impacts to birds that the National Academies identified. To examine offshore wind impacts to birds, we reviewed documentation including agency reports reviewing the state of the science, such as the Department of Energy's Offshore Wind Synthesis of Environmental Effects Research project, as well as academic research papers identified through our literature review described above.

[4]The Magnuson-Stevens Fishery Conservation and Management Act of 1976 established eight U.S. Regional Fishery Management Councils to manage fishery resources in federal waters of the U.S. Pub. L. No. 94-265, § 302, 90 Stat. 331, 347–51 (codified as amended at 16 U.S.C. § 1852). Each council prepares fishery management plans and associated regulations for fisheries requiring conservation and management within their region. 16 U.S.C. § 1852(h).

California. We also interviewed representatives from four other industries impacted by offshore wind development, such as maritime shipping, renewable energy development, and undersea transmission cables. We also interviewed additional federal agency stakeholders involved in maritime navigation and security, including Coast Guard district officials with active offshore wind construction and operations in their jurisdictions.

To examine the mechanisms BOEM, in coordination with other agencies, has in place to oversee offshore wind energy development, we reviewed agency documentation and interviewed agency officials about agencies' roles and responsibilities and their oversight of the offshore wind development planning, construction, and operations.

Also, as part of our second objective, to examine federal offshore wind oversight and development roles and responsibilities, as well as coordination across federal agencies, we reviewed documentation from BOEM and BSEE, including agency rules regulations, standard operating procedures, departmental manuals, and memorandums of agreement across entities. To examine BOEM and BSEE oversight of the offshore wind planning, construction, and operations processes, we reviewed (1) documentation for planned and ongoing offshore wind projects, such as site assessment plans, construction and operations plans, and EISs; (2) records of decision; and (3) draft and final published guidance to developers. We also reviewed BOEM and BSEE documentation related to public outreach and coordination with states, local governments, and Tribes, such as Intergovernmental Renewable Energy Task Force charters and tribal consultation reports. We compared BOEM and BSEE oversight efforts with laws and agency guidance relevant to tribal consultation, BOEM guidelines for mitigating impacts to fisheries, GAO's leading practices to enhance interagency collaboration, and internal control standards related to using quality information and clearly defining objectives.

We conducted this performance audit from August 2023 to April 2025, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: List of Experts Participating in GAO's 2024 Expert Interviews

Table 5: Experts Participating in GAO's (Virtual) 2024 Expert Interviews

Expert	Areas of expertise	Affiliation
Eric Brazer	Fisheries	Gulf Reef Fish Shareholders' Alliance
David Brigada	Radar	Massachusetts Institute of Technology
Helen A. Brohl	U.S. Marine Transportation System	U.S. Committee on the Marine Transportation System (retired)
Steven DiMarco	Oceanography	Texas A&M University
Syma Ebbin	Fisheries and resource management	University of Connecticut
Maha Haji	Ocean co-use	Cornell University
Cris Hein	Bats	National Renewable Energy Laboratory
Sarah Henkel	Benthic ecology	Oregon State University
Steve Joner	Tribal fisheries	Makah Tribe's Fisheries Management
Benjamin Karlson	Radar	Sandia National Laboratories
Jonathan Kaskin	Navy (defense)	Center for Naval Analysis
Robert Kenney	Marine vertebrates	University of Rhode Island (retired)
Jonathan Levy	Public health and environmental justice	Boston University
Andrew McGovern	Maritime safety and navigation	Sandy Hook Pilots Association
Richard Merrick	Marine conservation	NOAA Fisheries (retired)
David Monti	Recreational fishing	No Fluke Fishing LLC
Doug Nowacek	Acoustic impacts to marine mammals	Duke University
Sara Pryor	Climate change	Cornell University
Kaustubha Ragukumar	Hydrodynamics	Integral Consulting, Inc.
David Secor	Fisheries	University of Maryland
Paul Thompson	Marine mammals and seabirds	University of Aberdeen
Christopher Wiernicki	Shipbuilding and naval architecture	American Bureau of Shipping
Elizabeth Wilson	Energy transformation	Dartmouth College

Source: GAO analysis of National Academies information. | GAO-25-106998

Appendix III: Comments from the Department of the Interior

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

Mr. Frank Rusco
Director
Natural Resources and Environment
Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Rusco:

Thank you for providing the Department of the Interior (Department) with the opportunity to review and comment on the Government Accountability Office (GAO) report titled *Offshore Wind Energy: Actions Needed to Address Gaps in Interior's Oversight of Development* (GAO-25-106998). We appreciate GAO's review and feedback. The Department generally agrees with the report findings and concurs with the recommendations for the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE). We note as a general matter that the report does not acknowledge the impact of the January 20, 2025, Presidential Memorandum entitled *Temporary Withdrawal of All Areas on the Outer Continental Shelf from Offshore Wind Leasing and Review of the Federal Government's Leasing and Permitting Practices for Wind Projects* (Presidential Memorandum). Any actions taken pursuant to the GAO's report will be consistent with this Presidential Memorandum, as provided below. The report also should utilize the name "Gulf of America" as opposed to the legacy name "Gulf of Mexico."

Recommendation 1: The BOEM Director should take steps to address gaps in its approach to Tribal consultation, including clearly demonstrating and routinely reporting on its progress. This should include ensuring that annual Tribal consultation reports clearly document decisions with Tribal implications and preparing and submitting to Tribes a record of consultation that describes input and how it was addressed, as well as the reasoning for any instances in which input was not incorporated.

Response: Concur. The Department concurs to the extent that this recommendation can be implemented consistent with the Presidential Memorandum. BOEM agrees that transparency with Tribes is essential to upholding the Department's trust obligations. BOEM understands the importance of engaging with Tribes early in the process of considering areas for potential development. To improve consistency and accountability, BOEM intends to better communicate with Tribes the progress and outcomes of Tribal consultations, including summaries of Tribal input, how that input was incorporated into decisions, and explanations if Tribal recommendations are not adopted.

Recommendation 2: The BOEM Director should take steps to ensure that it adequately demonstrates and publicly reports its consideration of fishing industry input.

Response: **Concur.** The Department concurs to the extent that this recommendation can be implemented consistent with the Presidential Memorandum. The Department agrees that potential impacts to fisheries must be considered in any potential future identification of prospective offshore areas for potential development, which is the focus of this recommendation. BOEM will seek to increase transparency in the planning and analysis process around how input received from commercial and recreational fisheries informs agency decision-making.

Recommendation 3: The BOEM and BSEE Directors should establish guidance for lessees with respect to lessees' communication and engagement plans, clearly define the agencies' respective roles and responsibilities, and develop a plan to monitor implementation of these plans.

Response: Concur. The Department concurs to the extent that this recommendation can be implemented consistent with the Presidential Memorandum. BOEM and BSEE are committed to holding lessees who conduct activities on the outer continental shelf to high standards of public outreach, engagement, and transparency with stakeholders. BOEM recognizes the importance of lessee communication and engagement with potentially affected federally recognized Tribes, the commercial and recreational fishing industries, and federal and state agencies, among others. In recent lease sales, BOEM has included stipulations that require lessees to develop plans to communicate and engage with these stakeholder groups and to report the activities to BOEM, as well as a progress report requirement that ensures that these plans are implemented to our satisfaction. The Department will consider BOEM's and BSEE's development of additional guidance for lessees that is consistent with both the recommendation and the content and timing considerations called for in the Presidential Memorandum.

Recommendation 4: The BOEM and BSEE Directors should take steps to ensure that they have sufficient resources in place to oversee offshore wind energy development, including by establishing a physical office to oversee development in the North Atlantic region.

Response: Concur. The Department concurs to the extent that this recommendation can be implemented consistent with the Presidential Memorandum. "Sufficient resources" are dependent on the effect to which offshore wind development is consistent with the Presidential Memorandum. Thus, whether existing resources are sufficient will depend on the reviews conducted pursuant to the Presidential Memorandum.

Recommendation 5: The BOEM Director should develop guidance and specific requirements for lessees' data collection and sharing across offshore wind energy projects.

Response: Concur. The Department concurs to the extent that this recommendation can be implemented consistent with the Presidential Memorandum. The Department agrees with GAO that where possible, the large quantities of data collected by offshore wind developers can and should be leveraged to the benefit of the greater scientific community, consistent with lessee claims of confidential business interests in data products and BOEM's data sharing requirements stipulated under 50 CFR Part 585.114.

Additional general and technical comments are provided in the enclosure. If you have any questions concerning this response, please contact Andrea Nygren, BOEM Audit Liaison Officer at andrea.nygren@boem.gov or (202) 208-4343 or the BSEE Audit Liaison Officer at audit_liaison@bsee.gov or (202) 322-7605.

Sincerely,

WALTER CRUICKSHANK

Digitally signed by WALTER CRUICKSHANK
Date: 2025.03.31 14:16:37 -04'00'

Walter D. Cruickshank
Exercising the Delegated Authority of the Assistant Secretary for Land and Minerals Management

Enclosure

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Frank Rusco, ruscof@gao.gov

Staff Acknowledgments

In addition to the contact named above, Janice Ceperich (Assistant Director), Jarrod West (Analyst-in-Charge), Adrian Apodaca, Travis Cady, Catie Carr, Caroline Christopher, Frank Garro, Wil Gerard, Cindy Gilbert, Matt McLaughlin, and Brennan Williams made key contributions to this report.

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