

FINDING OF NO SIGNIFICANT IMPACT

Proposed Sand Survey Activities for BOEM's Marine Minerals Program Atlantic and Gulf of Mexico

Pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations implementing NEPA (40 Code of Federal Regulations (CFR) parts 1500-1508), and the Department of the Interior (DOI) regulations implementing NEPA (43 CFR part 46), the Bureau of Ocean Energy Management (BOEM) prepared an Environmental assessment (EA) to evaluate the potential environmental impacts of geophysical and geological survey activities that support identification, delineation, monitoring, and scientific investigation of sand resources (herein referred to as sand survey activities) on the Atlantic and Gulf of Mexico Outer Continental Shelf (OCS).

This EA updates and supersedes previous NEPA documents addressing similar Marine Minerals Program (MMP) sand survey activities. BOEM plans to apply this document to achieve project-specific compliance provided proposed activities fit within the scope analyzed herein and all relevant mitigations are adopted. No new NEPA documents will be prepared unless proposed activities are beyond those analyzed (e.g., new equipment, operational parameters, or geographic area). BOEM will demonstrate how project-specific activities comport with the programmatic requirements specified.

Proposed Action

The purpose of the proposed action is to identify potential sand resources for projects as well as to facilitate access to and support management of OCS sand resources that may be needed in beach nourishment and coastal restoration projects. BOEM is proposing to conduct, fund, or authorize sand survey activities to identify, delineate, monitor, and research potential sand resources for future projects. The proposed action would include three components: (1) reconnaissance-scale surveys to identify and delineate OCS sand resources; (2) site-specific, high resolution geophysical surveys to further delineate borrow areas and investigate the presence of objects of archaeological significance, munitions of explosive concern (MEC), and hard bottom or other sensitive benthic habitat in the vicinity of potential borrow areas; and (3) research and/or monitoring surveys to detect geologic and morphological changes in sand resource areas.

Geophysical surveys aim to map the geologic framework and seafloor condition and may use sub-bottom profilers (e.g., boomer or chirp) or shallow surveys (e.g., multibeam, side-scan sonar, or magnetometer). These surveys may cover up to 8,000-16,000 line-miles (12,875-25,750 line-km) over the entire Study Area per year. Geological surveys collect sediment data and may be conducted with vibracores (approximately 15 per day) or benthic grabs (up to 50 per day). The proposed action also includes vessel transit to and from a survey site. No air guns or sparkers would be used. A rigorous mitigation strategy to minimize environmental effects is included as a component of the proposed action (Appendix B of EA as Attachment 1).

Alternatives to the Proposed Action

BOEM considered an alternative that included additional mitigation measures to reduce potential environmental impacts. This alternative would incorporate additional operational restrictions in the Atlantic and GOM OCS and time-area closures in the Atlantic. This alternative would also provide for a more deliberate assessment and consideration of seafloor-disturbing activities and avoidance measures. However, this alternative could require two mobilizations to an area if it is determined that additional (site-specific) investigation is warranted resulting in the potential increase in number of vessels, crew, and other equipment time and costs.

Under the No Action Alternative, a comprehensive and programmatic approach to sand survey activities on the Atlantic and Gulf of Mexico OCS would not occur. Instead, sand survey activities would most likely undergo individual NEPA and environmental compliance, which would require substantially more time. This inefficiency or time cost may jeopardize the execution and feasibility of some activities, or delay others, resulting in less information and data, limiting the effectiveness of BOEM's identification, stewardship, and management of sand resources.

Environmental Effects

The EA evaluates potential environmental effects resulting from proposed sand surveys along the shallow inner shelf of Atlantic and GOM OCS. The impacts considered in the EA may result from noise associated with active sound sources and vessel operations, strike risk associated with vessel presence/traffic, vessel waste and accidental discharges, and seafloor disturbance. Any future connected actions, such as dredging, conveyance and placement of OCS sand resources would be considered separately in subsequent environmental review. The EA identifies all mitigation, monitoring, and reporting requirements necessary to avoid, minimize, and/or reduce and track any adverse impacts that could result from the sand survey activities (Attachment 1).

Significance Review

Pursuant to 40 CFR § 1508.27, BOEM evaluated the significance of potential environmental effects considering both context and intensity factors. BOEM considered the potential significance of environmental effects in both spatial and temporal context. Potential effects are generally considered reversible because they are expected to be negligible to minor, localized, and short lived. No long-term, significant, or cumulatively significant adverse effects were identified. Ten intensity factors were considered in the EA and are specifically addressed below.

1. Impacts that may be both beneficial and adverse

Potential impacts to physical, biological, cultural, and socioeconomic resources have been considered. Adverse effects to benthic habitat and communities in the borrow areas are expected to be local, short-term, and reversible. No impacts on hard-bottom communities would be anticipated from sand surveys. Temporary displacement of marine life in the local area of activities could occur due to noise, primarily during geophysical surveys. Marine mammals (e.g., humpback whales, seals, and dolphins), fishes (e.g., black seabass and drums), and sea turtles (e.g., loggerhead) may temporarily change their foraging or migratory behavior to avoid activities. These potential effects will be avoided and significantly reduced by having observers maintaining

avoidance zones and implementing shut-down protocols. A few marine animals may also be attracted to lighted vessels at night, which could cause minor disruptions to behaviors such as migration and feeding. To avoid these impacts, geophysical surveys would occur in daylight hours to the maximum extent practicable. If nighttime geophysical surveys are required, the lighting effects would be decreased through reduction, shielding, lowering, and appropriate placement of lights to avoid attracting or disturbing birds and bats. Other effects on biological resources, such as marine mammals and sea turtles, are discussed below. Any effect on recreational or commercial fishing would be minimized to negligible levels with the implementation of conflict avoidance measures, including advance notice through Notices to Mariners.

2. The degree to which the proposed action affects public health or safety

Survey work must be conducted in accordance with an environmental protection plan that addresses marine pollution and waste. Any potential impact on the public from low-level vessel emissions would happen for short periods of time in coastal areas when survey vessels are mobilizing, demobilizing, and refueling. Vessel emissions would only slightly and temporarily increase ambient concentrations of criteria pollutants offshore due to the combustion of diesel fuel. During sand survey activities, emissions from vessel operations are generally expected to be far enough offshore and disperse rapidly given prevailing meteorological conditions so as to not contribute to onshore air quality or ozone violations and/or increase pollutants such that public health is affected. During mobilization, emissions would be localized and temporary such that air quality is not expected to change.

3. Unique characteristics of the geographic area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas

This project would not affect prime or unique farmland, park lands, designated wild and scenic reaches, or wetlands. The proposed action is not likely to adversely affect listed species and their critical habitats. Sand survey activities would be scheduled to avoid areas designated as North Atlantic right whale critical habitat or seasonal management areas. Surveys could result in negligible to minor effects on essential fish habitat, but given the limited spatial and temporal extent of the surveys, these impacts will not adversely affect essential fish habitat on a broad scale. Sensitive hard-bottom and benthic communities would be avoided by at least 500 ft (150 m), which will decrease potential impacts. It is also unlikely that the surveys would affect these habitats because they are not in areas where there are sand-rich deposits.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial

No effects are expected that are scientifically controversial. The effects analyses in the EA has relied on the best available scientific information, including numerous studies and monitoring efforts evaluating the effects of sand surveys on marine mammals, benthic communities, sea turtles, and marine and coastal birds.

5. *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks*

Sand surveys are regularly conducted to determine the presence of, facilitate access to, or monitor beach-compatible sand resources on the Atlantic and Gulf of Mexico OCS. The field methods included in the proposed action to identify, delineate, monitor, and research OCS sand resources are well established. Mitigation measures aim to reduce or eliminate environmental impacts and have been demonstrated to be effective. The effects of the proposed action are not expected to be highly uncertain, and the proposed activities do not involve any unique or unknown risks.

6. *The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration*

No precedent for future action or decision in principle for future consideration is being made in BOEM's decision to conduct comprehensive and systematic sand surveys. BOEM's survey authorization of the surveys does not dictate the outcome of future leasing decisions regarding future use of identified sand resources. Future actions could be subject to the requirements of NEPA and other applicable environmental laws.

7. *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts*

Significance may exist if it is reasonable to anticipate cumulatively significant impacts that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. The EA finds that the activities related to the proposed action are not reasonably anticipated to incrementally add to the effects of other activities to the extent of producing significant effects. Any resources impacted by the proposed action are expected to recover quickly due to the short-term, localized nature of the sand surveys. Therefore, no significant cumulative impacts are expected to occur from conducting sand surveys.

8. *The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places, or may cause loss or destruction of significant scientific, cultural, or historical resources.*

Seafloor-disturbing activities (e.g., geological sampling and anchoring if use of dynamic positioning or live-boating is not possible) would occur during geological sampling. Archaeological clearance surveys would be performed in advance of seafloor-disturbing activities and an exclusion area around known sites will be observed. All geological sampling must avoid potential archaeological resources by a minimum of 164 feet (ft) (50 meters [m]). All associated anchoring, if any, must avoid potential archaeological resources by 328 feet (100 m). If surveys are planned to occur in Alabama State waters, additional consultation and coordination with the Alabama State Historic Preservation Office (SHPO) would occur, as requested. BOEM will also stop work and engage the appropriate SHPO and/or federally recognized Tribes should submerged cultural resources be unexpectedly discovered. All of these activities are in full compliance with the National Historic Preservation Act, as amended; the Archaeological and Historic Preservation Act, as amended; and Executive Order 11593.

9. *The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973*

Endangered or threatened marine mammals are not likely to be adversely affected by the project except for few numbers and short-term behavioral changes related to noise exposure or vessel presence. The proposed action includes numerous measures to minimize noise exposure and strike risk to threatened and endangered species during proposed sand surveys. The proposed action would not likely adversely affect critical habitat of any species (as discussed in #3 above). Negligible to minor impacts would be expected on endangered or threatened sea turtles, fish, and marine and coastal birds given the operational constraints and same comprehensive mitigation program being implemented. BOEM informally consulted with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (FWS), and the agencies concurred with BOEM's determination.

10. *Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.*

BOEM, its contractor(s), and cooperating partners must comply with all applicable Federal, state, and local laws and requirements. All survey operators must provide an environmental protection plan that verifies compliance with environmental requirements. BOEM has consulted with NMFS, FWS, the Advisory Council on Historic Preservation (ACHP) and SHPOs, and Coastal Management Program offices. Conditions provided by relevant States according to their Coastal Management Programs must be incorporated into proposed survey activities. Based on survey parameters, survey duration, and a comprehensive suite of mitigation measures, BOEM has determined that marine mammals are very unlikely to experience Level A or B harassment. Therefore, the effects are discountable, and the type of survey activities included in the proposed action are in compliance with the Marine Mammal Protection Act. Federal and state partners and or third-party contractors should independently review the potential for harassment provided project-specific information and determine if an Incidental Take Authorization is needed for proposed activities. Migratory birds are not likely to be adversely affected by the proposed action.

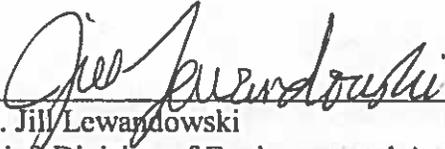
Consultations and Public Involvement

BOEM has coordinated with the NMFS, FWS, ACHP, SHPOs, affected federally recognized Native American Tribes, and State Coastal Management Programs. Pertinent correspondence with Federal agencies is provided in Appendices C, D, and E of the EA. The Draft EA was subject to a 30-day public comment period. The FONSI and EA will be posted on BOEM's website at <https://www.boem.gov/Regional-Projects/>.

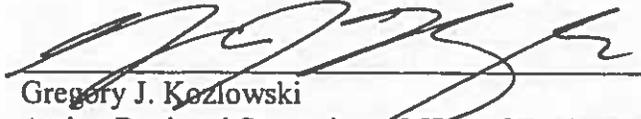
Conclusion

BOEM has thoroughly considered the consequences of the proposed action (Alternative A). BOEM prepared the attached EA (Attachment 1) and finds that it complies with the relevant provisions of the Council on Environmental Quality regulations implementing NEPA, DOI regulations implementing NEPA, and other MMP requirements. Appropriate terms and conditions enforceable by BOEM will be incorporated into the environmental protection plan to avoid,

minimize, and/or mitigate any foreseeable adverse impacts. Based on the evaluation of potential impacts and mitigating measures discussed in the EA, BOEM finds that conducting the proposed sand surveys, with the implementation of the mitigating measures, does not constitute a major Federal action significantly affecting the quality of the human environment under Section 102(2)(C) of the NEPA, and will not require preparation of an environmental impact statement.



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Atlantic and Gulf of Mexico

Final Environmental Assessment

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1 Introduction

The Bureau of Ocean Energy Management's (BOEM) Marine Minerals Program (MMP) has prepared an environmental assessment (EA) to describe and evaluate the potential environmental impacts related to shallow geological and very high resolution geophysical (G&G) survey activities that support identification, delineation, monitoring, and scientific investigation of sand resources (herein referred to as sand survey activities) on the Atlantic and Gulf of Mexico (GOM) Outer Continental Shelf (OCS) (Figure 1-1). The proposed activities, funded, managed, or authorized by BOEM, would occur along the shallow inner shelf of BOEM's North Atlantic, Mid-Atlantic, South Atlantic, Straits of Florida, and the Gulf of Mexico's Eastern, Central, and Western Planning Areas. The actual survey activities may be undertaken by BOEM contractors, or Federal, state, and local partners and their contractors. This EA provides an analysis to help determine whether significant impacts on Atlantic and GOM resources could occur as a result of the proposed sand survey activities and specifies mitigation measures that would be implemented to avoid, reduce, minimize, rectify, or compensate for impacts.

BOEM has prepared this EA in compliance with the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] §§ 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations (Title 40 Code of Federal Regulations [CFR] parts 1500–1508); and U.S. Department of the Interior (DOI) regulations (43 CFR part 46). This NEPA process has been integrated to achieve compliance with other environmental regulations to reflect relevant environmental concerns, avoid delays, and address potential conflicts or challenges.

This EA updates and supersedes previous NEPA documents addressing similar MMP sand survey activities. BOEM plans to apply this document to achieve project-specific compliance provided proposed activities fit within the scope analyzed herein and all relevant mitigations are adopted. No new NEPA documents will be prepared unless proposed activities are beyond those analyzed (e.g., new equipment, operational parameters, or geographic area) or substantial new information becomes available. BOEM will demonstrate how project-specific activities comport with the programmatic requirements specified.



Figure 1-1. Proposed Study Area for Sand Survey Activities in Support of BOEM’s Marine Minerals Program

1.1 BACKGROUND

BOEM is responsible for managing the extraction of non-energy minerals (primarily sand and gravel) for, among other things, use in coastal resiliency and storm damage reduction projects, including beach nourishment and coastal restoration. As stewards of OCS sand and gravel resources, BOEM, through its Marine Minerals Program (MMP), must carefully manage their use while supporting coastal resiliency initiatives to nourish eroded beaches, conserve sensitive wildlife areas, and restore barrier islands and wetlands that provide natural protection from storms. By proactively developing an inventory of OCS sand resources, BOEM is in the unique position to manage use conflicts and foster ecosystem health while supporting the following national interests:

- provide resources to Federal and state agencies and localities to reduce damages to coastal infrastructure;
- respond to emergency requests for use of OCS sand resources following storm events; and
- restore parkland, wildlife refuges and habitat, and other areas, which can promote the long term sustainability of communities and ecosystems.

To determine which OCS areas contain compatible sand resources (generally based on sediment grain size, shape, sorting, color, mineralogy, sediment deposit volume and geometry, and proximity to project sites) and facilitate stewardship responsibilities, BOEM is proposing to conduct, fund, or authorize sand survey activities to identify, delineate, monitor, and research potential sand resources for future projects.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to identify potential sand resources for projects as well as facilitate access to and support management of OCS sand resources that may be needed in beach nourishment and coastal restoration projects. By collecting and analyzing sand survey data prior to an immediate or emergency need, BOEM can help proactively identify sand resources for enhancing coastal resiliency, better manage resources within its jurisdiction, and develop a more comprehensive understanding of available resources. Geophysical surveys are also helpful in the study, management, and monitoring before, during, and after dredging to ensure resource stewardship. Data collected may support programs such as the MMP's National Sand Inventory and Deepwater Horizon Gulf Restoration programs, which includes but is not limited to; the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) and Natural Resource Damage Assessment and Restoration (NRDAR).

The proposed action is needed to identify additional OCS sand resources for beach nourishment and coastal restoration projects because sand resources in State waters are either diminishing or are of poor quality, or otherwise unavailable. Dredging sand closer to shore in State waters can also lead to more severe environmental effects. Using nearshore sand often occurs within the active coastal system, compromising long-term effectiveness of projects and failing to address the need to supplement a deficit in the coastal sand budget. Using OCS sand resources introduces new sand from outside of the active

coastal system to decrease the coastal sand deficit, improving project sustainability and geomorphic function (Hilton and Hesp 1996).

1.3 REGULATORY FRAMEWORK

The Outer Continental Shelf Lands Act (OCSLA), as amended, provides DOI the authority to manage minerals on the United States OCS out to 200 nautical miles (nmi) (230 miles [m]; 370 kilometers [km]) from shore. Section 11 of the OCSLA, as amended, authorizes the Secretary of the Interior (Secretary), through BOEM, to approve the exploration of marine minerals (e.g., sand, gravel, and shell resources). The OCSLA defines the term “exploration” as the process of searching for minerals, including geophysical surveys and geological sampling. Section 8(k) of the OCSLA allows BOEM to negotiate, on a noncompetitive basis, the rights to OCS sand, gravel, or shell resources for shore protection, beach or wetlands restoration projects, or use in construction projects funded in whole or in part by, or authorized by, the Federal Government. In addition, Section 19(e) authorizes the use of cooperative agreements with affected States and eligible stakeholders to meet the requirements of the OCSLA, including the sharing of information, joint utilization of available expertise, and formation of joint monitoring arrangements to carry out applicable Federal and State laws, regulations, and stipulations relevant to OCS operations both onshore and offshore. BOEM uses cooperative agreements with Atlantic and Gulf Coast States to assist in the inventory of offshore sand resources.

BOEM works diligently to ensure that all actions on the OCS are undertaken in a technically safe and environmentally sound manner. This EA is being used to support associated consultations according to other environmental laws, including the Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Coastal Zone Management Act (CZMA), National Historic Preservation Act (NHPA), and Executive Order 13175 (Chapter 4).

1.4 OBJECTIVES, SCOPE, AND STUDY AREA

The objectives of this EA are to:

- characterize proposed sand survey activities that support identification, delineation, monitoring, and research of sand resources on the Atlantic and Gulf of Mexico OCS;
- describe the proposed action and alternatives;
- identify and analyze direct, indirect, and cumulative impacts that could result from implementing the proposed action and alternatives; and
- evaluate mitigation measures that are practical and feasible to ensure impacts on the human and natural environments are avoided or minimized to the extent possible.

The Study Area lies within the Atlantic and GOM federal waters out to 50 meters (m) (164 feet [ft]) deep (Figure 1-1), plus state waters investigated through state cooperative agreements. Sand survey activities would not occur across the entire Study Area simultaneously, but would be of limited spatial extent at any one time. The Study Area includes adjacent transit corridors used for vessel mobilization, demobilization, and access to support bases. Sensitive and protected areas, such as Cape Cod Bay,

Stellwagen Bank National Marine Sanctuary, and Florida Keys National Marine Sanctuary, are specifically excluded.

Depending on the project need, BOEM may participate in, fund, or authorize sand survey activities. If warranted, BOEM would coordinate with key partners in coastal states, Federal stakeholders, and relevant regional planning bodies at BOEM Sand Management Working Groups (SMWG) and other facilitated meetings to determine areas with the greatest potential need for OCS sand resources and the greatest data gaps, in order to identify priority survey sites. To the extent possible, BOEM would use existing information in the “Marine Minerals Information System” to inform future surveys. Detailed survey and sampling plans would be developed and coordinated as appropriate prior to undertaking any sand survey activities; these plans would define the geographic scope and relative timing of the proposed activities and consultations.

Similar activities could occur in adjacent State waters as an extension of OCS resource area identification and delineation, but unless these activities occur as part of a BOEM cooperative agreement, these are not considered in this analysis. Construction activities, including beach nourishment and wetlands reconstruction, are not considered connected actions and are not included in this analysis. Any such proposals would be considered individually and subjected to separate environmental reviews.

2 Description of the Proposed Action and Alternatives

2.1 RANGE OF ALTERNATIVES

The proposed action is a set of comprehensive sand survey activities using state-of-the-art technology and methods to identify, delineate, monitor, and research OCS sand resources. The proposed action would include three components: (1) reconnaissance-scale surveys to identify and delineate OCS sand resources; (2) site-specific, high resolution geophysical surveys to further delineate borrow areas and investigate the presence of objects of archaeological significance, munitions of explosive concern (MEC), and hard bottom or other sensitive benthic habitat in the vicinity of potential borrow areas; and (3) research and/or monitoring surveys to detect geologic and morphological changes in sand resource areas. Specifically, BOEM’s action is to participate in, fund, or authorize these activities. Sand survey equipment types and techniques used to support these activities were presented in previous BOEM documents (BOEM 2014a, BOEM 2014b, BOEM 2017) and are incorporated by reference, with some details summarized in Appendix A. No air guns or sparkers would be used. Data would be collected in close coordination with or by States and will support both long-term and emergency planning goals of BOEM’s Marine Minerals Program and would be distributed widely among coastal stakeholders for their planning purposes. A rigorous mitigation strategy to minimize environmental effects is included as a component of the proposed action (Appendix B). This NEPA analysis will stand in perpetuity, with an evaluation of accuracy and any necessary updates at least every five years, unless a change in the proposed action or new information warrants updating sooner.

The action alternatives are alike in scope and vary only by the sequence of data collection and in mitigation measures affecting the duration/time of operations and technology (summarized in Chapter 2.2 and detailed in Appendix B). Alternatives A and B address the purpose and need as outlined in Chapter 1.2, along with the No Action Alternative required by NEPA. Evaluated in this EA and described below are the following alternatives: A – The Proposed Action; B – Additional Operational Restrictions and Time-Area Closures; and C – No Action Alternative.

2.2 ALTERNATIVE A: PROPOSED ACTION

The proposed action is a comprehensive and systematic data collection approach to identify, delineate, monitor, and research Atlantic and Gulf of Mexico OCS sand resources. Historically, BOEM has funded and conducted varying levels of effort on the OCS to identify sand resources and delineate potential borrow areas. In some areas, reconnaissance studies are still needed as a first step to identify potential sand resources. Reconnaissance studies use wider spaced survey lines over comparatively large areas (i.e., regional in scope) to identify sand bodies and characterize the shallow geological framework and surficial geology of potential sand resources. These surveys would help to ascertain if sand resources are of a certain quality (sediment type) and quantity to warrant further exploration. Site-specific studies use tighter line spacing over a smaller area to delineate the lateral and vertical extent of borrow areas and to determine the presence of any limitations to the use of these resources (e.g., cultural resources, sensitive habitat, etc.). Additionally, surveys may occur before and after a dredge event to monitor any changes to a sediment resource and/or conduct specific research to understand the complexities of the environment (e.g., physical, biological, geological, etc.) and potential implications in accordance with BOEM's stewardship responsibilities.

Surveying would not be continuous; rather, most surveys would be small in spatial scale and short in duration. It is anticipated that approximately 70–85 percent of the survey work conducted under the proposed action would be reconnaissance in nature and that 15–30 percent would be site-specific, high-resolution surveys. Sand survey activities, whether reconnaissance or site-specific in nature, could be conducted simultaneously or in sequence, depending upon the information needs, field conditions, and efficiency factors.

Two general survey types would be employed: geophysical surveys for mapping the geologic framework and seafloor condition and geological surveys to collect sediment samples and shallow sediment cores (20 ft [6.1 m] maximum length). The geophysical surveys obtain information about sedimentary architecture, shallow hazards (e.g., MEC or buried cables), archaeological resources, and sensitive benthic habitats and do not impact the seafloor; geological surveys collect information on sediment composition and textural properties and do impact the seafloor. Survey techniques and equipment are shown in Table 2-1 and described in Appendix A. Vessels would range from approximately 28 to 120 ft (9 to 37 m) and operate at expected speeds shown below.

- Surveys: 3-5 knots (kn) (5.6-9.3 kilometers per hour [km/hr])
- Transit: 10-12 kn (19-22 km/hr)
- North Atlantic right whale (NARW) areas or if sighted (refer to Appendix B): ≤10 kn (19 km/hr)
- Nighttime surveys with sea turtles present: 5 kn (9.3 km/hr)

Surveys would aim to decrease the overall number of vessel mobilizations and reduce redundant data collection. The survey design and selection of technologies, deployment modes, and timing would balance data quality needs and avoid and minimize potential environmental impacts. To the extent possible, BOEM proposes to use the least number of lowest-energy (and highest-frequency) acoustic sources to obtain the necessary geophysical data, thereby reducing the potential for impacts to marine animals. Appendix A provides a more detailed characterization of these proposed sources and their sound propagation characteristics. No airguns or sparkers would be used.

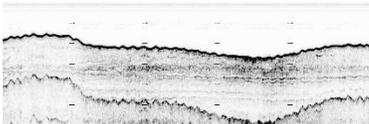
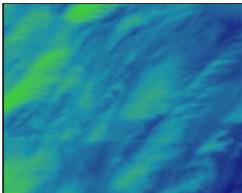
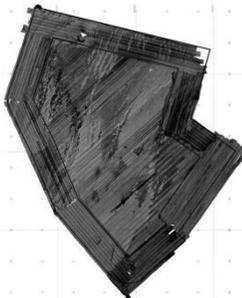
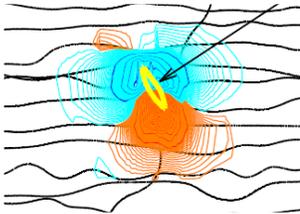
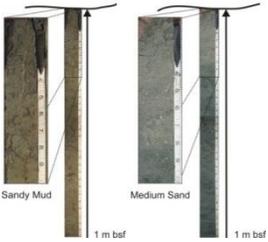
On average, up to about 70 line-miles (113 line-km) of geophysical data could be collected per day, assuming that site-specific survey data are not collected simultaneously with reconnaissance-level data. It is anticipated that up to 8,000-16,000 line-miles (12,875-25,750 line-km) of geophysical surveys could be collected for the entire Study Area in one year. Actual surveys would be discontinuous in time and geography, where the typical individual survey is smaller in terms of contiguous survey area (< 100-1000 km²). For sediment samples, which are primarily used to ground-truth the geophysical data, approximately 15 vibracores and up to 50 benthic grabs per day could be collected, although it is anticipated that most would be vibracores, with a small portion being grab samples. Up to 2,000-3,000 geological samples could be collected in one year. All estimates are based on one vessel completing the surveys; however, more than one vessel could be used. For a given survey, a vessel and crew would mobilize, though frequency would depend on the location and scope of activities.

All activities would comply with relevant environmental laws, mitigation measures, and best practices including BOEM protocols and guidelines (Appendix B), including:

- time-area restrictions for geophysical surveys in the Atlantic;
- a geophysical survey protocol;
- a vibracore sampling protocol;
- nighttime surveying and passive acoustic monitoring protocol;
- a vessel strike avoidance protocol;
- sea turtle and smalltooth sawfish “construction” conditions;
- historic and pre-contact site avoidance and reporting requirements;
- sensitive benthic habitat and communities avoidance requirements;
- marine pollution control plan;
- marine debris awareness program;
- navigational and commercial fisheries conflicts minimization requirements; and
- advance notification of survey activities in military warning and test areas, or NASA launch areas.

These measures are consistent with those from previous geological and geophysical NEPA documents (BOEM 2014a, BOEM 2014b, BOEM 2017) and are discussed in Appendix B. Strategies to track, monitor, and report the results of mitigations would be established during the development of the detailed survey plans on a project-by-project basis.

Table 2-1. Geophysical and Geological Survey Techniques for Sand Surveys

Survey Purpose	Depiction of Acquired Data	Survey Technology	Platform/ Equipment Used
Identify near-bottom sedimentary architecture		Sub-bottom profiling: chirp or boomer	Vessel, chirp profiler or boomer, and hydrophone array (only with boomer)
Map seafloor bathymetry, image the seafloor, archaeological resources, and benthic habitat potential		Bathymetry: multibeam or interferometric swath	Vessel, multibeam, or interferometric transducer
Image the seafloor, archaeological resources, benthic habitat potential, and relic landscapes		Side-scan sonar or acoustic backscatter from multibeam or interferometric swath	Vessel, side-scan sonar (mounted or towed), multibeam, or interferometric transducer
Archaeological resources and hazards potential, including munitions of explosive concern (MECs)		Magnetometer	Vessel, magnetometer tow fish
Verify geophysical data, determine sediment attributes and beach compatibility		Vibracoring	Vessel, vibracore rig, core barrel (20-ft [6m] penetration maximum), limited anchoring if not using dynamic positioning or live-boating
Determine sediment attributes and beach compatibility		Benthic grab	Vessel, benthic grab, limited anchoring if not using dynamic positioning or live-boating

2.3 ALTERNATIVE B: ADDITIONAL OPERATIONAL RESTRICTIONS AND TIME-AREA CLOSURES

This alternative includes the same proposed activities with the same mitigation suite as Alternative A, but additional mitigation requirements and restrictions would be employed. This alternative is designed to meet the underlying purpose and need, while incrementally reducing environmental impacts from survey activities. Mitigation measures applicable to proposed activities in Alternative B would include implementation of:

- additional operational restrictions for all geophysical surveys; and
- additional site-specific, time-area closures in the Atlantic.

These mitigation measures are discussed in more detail in Appendix B.

2.4 ALTERNATIVE C: NO ACTION

Under the No Action Alternative (required under 40 CFR § 1502.14(d)), a comprehensive and programmatic approach to the inventory, study, and monitoring of sand resources in the Atlantic and Gulf of Mexico OCS would not occur. Instead, sand survey activities would undergo individual NEPA and environmental compliance, which would require substantially more time. This time cost may jeopardize the execution and feasibility of some activities, resulting in fewer surveys and thus, less information and data. The No Action Alternative would limit the effectiveness and efficiency of BOEM's management of OCS sediment since the understanding of the quantity and quality of this sediment would likely decrease. Without environmental coverage for sand survey activities in place, BOEM may also be delayed in emergency situations following extreme weather events when sand sources need to be identified and managed. Issuance of agreements for use of OCS sand would continue.

3 Description of Affected Environment and Environmental Considerations

This chapter characterizes the environmental resources and describes the potential impacts on those Study Area resources that could occur from implementing the proposed action and alternatives.

3.1 RESOURCES DISMISSED FROM FURTHER ANALYSIS

BOEM reviewed several recent environmental documents that address potential effects from sand survey activities and other G&G sampling on physical, biological, and sociocultural resources (MMS 2004, NSF and USGS 2011, BOEM 2014a, BOEM 2014b, BOEM 2017, NOAA 2013, CSLC 2013). Impact-producing factors most relevant to the proposed activities include (1) noise from active sound sources and vessel operations, (2) strike risk associated with vessel presence/traffic, (3) vessel wastes and accidental discharges, and (4) seafloor disturbance.

CEQ instructs Federal agencies to focus the effects analysis on those effects and issues in a manner proportional to their relevance and potential significance. Negligible impacts are expected to result from the proposed activities to the five resource areas discussed below and will not be evaluated further:

- *Air Quality*: Small survey vessels involved in sand survey activities emit a variety of air pollutants including nitrogen oxides, sulphur oxides, particulate matter, volatile organic compounds, carbon monoxide, and greenhouse gas emissions (e.g., carbon dioxide). Emissions from vessel operations are expected to be far enough offshore and localized during transit that they would disperse rapidly, so as to not contribute to onshore air quality, ozone violations, and/or increase pollutants such that public health is affected.
- *Water Quality*: Water quality could be affected during survey operations following discharge of sanitary and domestic wastes and cooling water. Although accidental fuel spills are unexpected, all operations would be conducted under a marine pollution control plan (Appendix B). An increase in turbidity may occur from geological sample collection, but these activities are temporary and short-term, therefore the effects are expected to be negligible. Due to the operational and regulatory requirements, BOEM has determined that impacts on water quality would be very limited and localized.
- *Phytoplankton and Zooplankton*: Primary and secondary production supports higher trophic levels, including forage fishes, large fishes, seabirds, sea turtles, and marine mammals. Impacts on phytoplankton and zooplankton would be minimal and limited to the area immediately around sound sources or if water quality conditions were to become impaired.
- *Aesthetics*: The presence of intermediate-size survey vessels (typically 50-150 ft [15-46 m] in length) is not unusual offshore the Atlantic and Gulf of Mexico seaboards. Sand survey vessels would be far enough offshore, with some beyond the visibility of the shoreline, and operations are spread over a relatively large inner shelf area for a limited time, which would minimize visual impacts at any specific location. Also, survey operations occur more during daylight hours so lighting during nighttime operations would be minimized.
- *Environmental Justice*: The proposed activities are not expected to result in disproportionate impacts on minority or low-income populations because effects on the coastal environment, especially in the vicinity of ports and coastal inlets, would be very limited, short-term, and far enough offshore and disbursed over a large geographic area so as to not contribute to environmental justice issues for a specific community.

3.2 DESCRIPTION OF IMPACT LEVELS

This EA addresses the environmental impacts of each alternative by resource area, considering the unique attributes of the resource being evaluated. Effects could be direct, indirect, and cumulative. Direct impacts are caused by the activity and occur at the same time and place. Indirect impacts are caused or induced by the activity and occur later in time, or are removed spatially from the location of the activity. Cumulative impacts are those that result from the incremental effect of the activity in combination with other past, present, or reasonably foreseeable future actions. For the purposes of this analysis, impacts are classified as one of four levels.

- **Negligible**: Little or no measurable/detectable impact.

- **Minor:** Impacts are detectable, short-term, extensive or localized, but not severe.
- **Moderate:** Impacts are detectable, short-term, extensive, and severe; impacts are detectable, short-term or long-lasting, localized, and severe; or impacts are detectable, long-lasting, extensive or localized, but less than severe.
- **Major:** Impacts are detectable, long-lasting, extensive, and severe.

3.3 AFFECTED RESOURCES AND ENVIRONMENTAL IMPACTS

3.3.1 Atlantic

A previous analysis (BOEM 2014b) includes a comprehensive description of Atlantic resources and an analysis of nearly identical proposed sand survey activities. To streamline the current analysis, the previous work has been incorporated by reference and summarized in Table 3-1. Several updates have been identified for: (1) marine mammals, (2) fish and Essential Fish Habitat (EFH), (3) benthic habitat and communities, (4) sea turtles, and (5) marine and coastal birds. For all resources in both the Atlantic and GOM OCS, Alternative A identifies potential impact levels. The analysis for Alternatives B and C provide contextual changes to those potential impacts (e.g., more or less based on context) but unless otherwise stated, fall within the same impact level. Cumulative effects, for both the Atlantic and GOM, can be found in Chapter 3.5.

Table 3-1. Summary of Atlantic Resources and Sand Survey Activity Impacts Previously Analyzed (BOEM 2014b)

Resource	Description Summary	Environmental Impacts		
		Alternative A: The Proposed Action	Alternative B: Additional Operational Restrictions and Time-Area Closures	Alternative C: No Action
Marine Mammals	A total of 39 marine mammals occur in the Atlantic, representing three taxonomic orders: Cetacean, Sirenia, and Carnivora. Six of these marine mammals species are federally listed as endangered, of which only the manatee (<i>Trichechus manatus latirostris</i>), North Atlantic right whale (<i>Eubalaena glacialis</i>), and fin whale (<i>Balaenoptera physalus</i>) are likely to occur. Other non-listed marine mammals such as the humpback whale (<i>Megaptera novaeangliae</i>), gray (<i>Halichoerus grypus atlantica</i>) and harbor seals (<i>Phoca vitulina</i>), and several dolphin species (Delphinidae) may also occur.	Potential impacts from active acoustic and vessel noise, vessel presence/traffic, vessel wastes and discharges, and bottom disturbance would be negligible to minor because of the implementation of established comprehensive survey protocols and mitigation measures, particularly to limit exposure of marine mammals to noise.	Similar to Alternative A. Additional operational restrictions may lead to more vessel trips resulting in increased exposure to acoustic noise and a greater chance of vessel collisions. Time-area closures may lead to fewer incidental acoustic and marine noise impacts; however, closures could concentrate exposure and impacts within a different season. Impacts are expected to be negligible to minor.	The proposed action would be limited. Therefore, there would be fewer potential impacts on marine mammals.
Fish and Essential Fish Habitat	Two marine fish species that occur in the Study Area, the smalltooth sawfish (<i>Pristis pectinata</i>) and the Atlantic sturgeon (<i>Acipenser oxyrinchus oxyrinchus</i>), are currently listed as endangered. Many specific Habitat Areas of Particular Concern (HAPCs) have been identified for fishes in the Atlantic Region.	Potential impacts from active acoustic and vessel noise, vessel presence/traffic, vessel wastes and discharges, and bottom-disturbance impacts are expected to be negligible to minor due to proximity, mobility, and frequency of occurrence.	The HAPCs would be avoided during certain times of the year, potentially decreasing impacts to fish and EFH. Additional mobilizations would increase the potential impacts of vessel noise to pelagic, demersal, and highly migratory fish resources and EFH; however, impacts from sound sources and vessel and equipment noise would still be considered negligible to minor.	The proposed action would be limited. Therefore, there would be fewer potential impacts on pelagic, demersal, and highly migratory fish resources and associated EFH.

Resource	Description Summary	Environmental Impacts		
		Alternative A: The Proposed Action	Alternative B: Additional Operational Restrictions and Time-Area Closures	Alternative C: No Action
Benthic Habitat and Communities	The Study Area is comprised of many different bottom compositions with two species of coral, elkhorn (<i>Acropora palmata</i>) and staghorn (<i>A. cervicornis</i>), located in Florida and listed as threatened under the ESA.	Short-term, direct, and indirect impacts on soft bottom benthic resources, primarily through seafloor disturbance due to geologic sampling or anchoring would be expected to be negligible, as disturbed areas would be small and sensitive areas avoided, so that impacts on benthic communities would be localized and limited.	Impacts on benthic resources from implementing Alternative B would be similar to those described for Alternative A, though some areas may benefit from additional avoidance, or not impacted certain times of the year. Impact levels are expected to be the same as Alternative A.	The proposed action would be limited. Therefore, there would be fewer potential impacts to soft bottom benthic resources.
Sea Turtles	Five sea turtle species (loggerhead [<i>Caretta caretta</i>], green [<i>Chelonia mydas</i>], Kemp’s ridley [<i>Lepidochelys kempfi</i>], hawksbill [<i>Eretmochelys imbricata</i>], and leatherback [<i>Dermochelys coriacea</i>])) occur in the Study Area during certain time periods and life stages. All species are protected under the ESA.	Potential impacts from active acoustic and vessel noise, vessel presence/traffic, vessel waste and discharges, and seafloor disturbance. Activities would be expected to have negligible impacts on sea turtles, because mitigation measures would reduce the risk of vessel strike and noise impacts.	Additional operational restrictions may lead to more vessel trips, resulting in additional marine noise exposure and a greater chance for vessel collisions. However, eliminating nighttime surveys and additional time-area closures could result in a reduction in the likelihood of strikes and noise-related effects depending on location, time of year, and characteristic behavior. Negligible impacts are expected.	The proposed action would be limited. Therefore, there would be fewer potential impacts to sea turtles.

Resource	Description Summary	Environmental Impacts		
		Alternative A: The Proposed Action	Alternative B: Additional Operational Restrictions and Time-Area Closures	Alternative C: No Action
Marine and Coastal Birds and Bats	Four avian species listed under the ESA (piping plover [<i>Charadrius melodus</i>], roseate tern [<i>Sterna dougallii</i>], Bermuda petrel [<i>Pterodroma cahow</i>], and Kirtland’s warbler [<i>Setophaga kirtlandii</i>]) are either within or in close proximity to the Study Area. Additionally, there are three taxonomic and ecological avian groups of concern that are found within the Study Area including seabirds, waterfowl, and shorebirds, all of which are protected under the Migratory Bird Treaty Act.	Impacts from noise, vessel operations, accidental fuel spills, or discharge associated with the proposed activity are expected to be negligible to minor for birds and bats, including at-risk species, because of the localized footprint of activities relative to available foraging and resting areas.	Increased impacts on avian resources could occur from increased disturbance and accidental releases of trash, debris, and fuel or other vessel fluids from more vessel mobilizations. However, the overall intensity of effects would not be substantially different from Alternative A.	The proposed action would be limited. Therefore, there would be fewer potential impacts on birds and bats.
Historic/Pre-Contact Resources	Submerged cultural resources within the Study Area primarily include shipwrecks that date from early exploration and settlement of North America by Europeans through World War II and the Cold War period. Offshore archaeological resources that may exist within the Study Area may also include submerged pre-contact sites or relict landforms that have a potential to contain these sites.	Potential impacts from geological sampling and anchoring. It is highly unlikely, therefore negligible, that impacts would occur on submerged cultural resources or archaeological resources from seafloor disturbance because of mitigation measures to avoid these resources.	Impacts could be slightly less than Alternative A due to advance clearance before commencing any seafloor-disturbing activities that could impact submerged cultural resources. However, impacts are expected to remain negligible.	The proposed action would be limited. Therefore, there would be fewer potential impacts on historic/pre-contact resources.

Resource	Description Summary	Environmental Impacts		
		Alternative A: The Proposed Action	Alternative B: Additional Operational Restrictions and Time-Area Closures	Alternative C: No Action
Recreation	The scenic and aesthetic values of these diverse coastal areas play an important role in attracting visitors, providing a rich recreational and tourist experience, and driving the economies of coastal communities.	Effects on recreation due to the proposed action could result from temporary changes in the viewshed and an increase in vessel traffic, though this is expected to be negligible because activities would be temporary.	Additional operational restrictions may lead to more vessel trips and increased vessel traffic, which could introduce additional viewshed impacts.	The proposed action would be limited. Therefore, there would be fewer potential impacts on recreation.
Recreational and Commercial Fishing	The Study Area is used for both recreational and commercial fishing. Along the Atlantic coastal states, recreational and commercial fishing significantly contribute to marine economies and coastal communities. However, only about 6 percent of fishing includes taking trips offshore 3-200 nmi (4-230 mi; 6-370 km).	Potential multiple-use effects on recreational and commercial fishing include short-term displacement of fishing activities and potential damage to fishing equipment. Any effect on fishing, including space-use conflicts, would be minimized to negligible levels because of mitigation measures, such as advance public notification through the use of Notices to Mariners.	Additional operational restrictions may lead to more vessel trips and additional vessel traffic to conduct sequential survey work, which could temporarily exclude fishermen from specific areas that could be fished. However, these impacts would be short-term and negligible.	The proposed action would be limited. Therefore, there would be fewer potential impacts on recreational and commercial fishing.
Marine Transportation	The coastal zone and inner shelf offshore the U.S. East Coast is heavily traveled by marine vessels, including commercial shipping traffic transiting to and from major coastal ports. Recreational boaters are regularly found in the same area.	Any effect on vessel traffic outside of established waterways and airways, including potential delays from rerouting, would be minimized to negligible levels because of mitigation measures and advance public notification through the use of Notices to Mariners.	Additional operational restrictions may lead to more vessel trips and additional vessel traffic, which would result in increased impacts on marine transportation. However, impacts would be short-term and negligible and further reduced through mitigation measures.	The proposed action would be limited. Therefore, there would be fewer potential impacts on marine transportation.

Resource	Description Summary	Environmental Impacts		
		Alternative A: The Proposed Action	Alternative B: Additional Operational Restrictions and Time-Area Closures	Alternative C: No Action
Military and Civilian Space Program Uses	Military activities can include various air-to-air, air-to-surface, and surface-to-surface naval fleet, submarine, and antisubmarine training exercises.	Direct impacts on military and civilian space program activities could occur as a result of the incremental increase in vessel traffic from survey vessels, but the effect should be minor and short-term, because of the limited footprint and duration of the survey activity.	Additional operational restrictions may lead to more vessel trips and additional vessel traffic, which would introduce impacts that would generally be similar to, but slightly greater than, those discussed under Alternative A.	The proposed action would be limited. Therefore, there would be fewer potential impacts on military and civilian space program uses.
Cumulative Effects	Climate change, noise, oil and gas exploration, renewable energy site assessment, dredging of marine minerals, commercial and recreational fishing, military and space-use programs, transportation, dredged material disposal, and new cable infrastructure.	The proposed activities could incrementally affect underwater noise, vessel traffic and noise, discharges and accidental releases, and seafloor disturbance. The incremental contribution of the proposed action to cumulative effects is expected to be negligible to minor because of protocols and mitigations during the proposed activities to minimize impacts.	Cumulative effects of the proposed action would be similar to those discussed for Alternative A.	Limited activities contributing to cumulative effects would be expected.

Marine Mammals

The humpback whale's listing under the ESA was amended in 2016 from endangered to a Distinct Population Segment (DPS) that is not at risk in the Study Area (81 FR 62259). North Atlantic right whale critical habitat was expanded in 2016 (81 FR 4837); there is a northeast and southeast U.S. component (Figure 3-1). Seasonal Management Areas (SMAs) with mandatory speed restrictions are located along the U.S. East Coast. Additionally, Dynamic Management Areas (DMAs) with voluntary speed restrictions may be established in the presence of these whales (e.g., NMFS 2018). Population data from 2012 indicate an estimated stock size of 440 individuals, which is the lowest number recently recorded (NMFS 2017c).

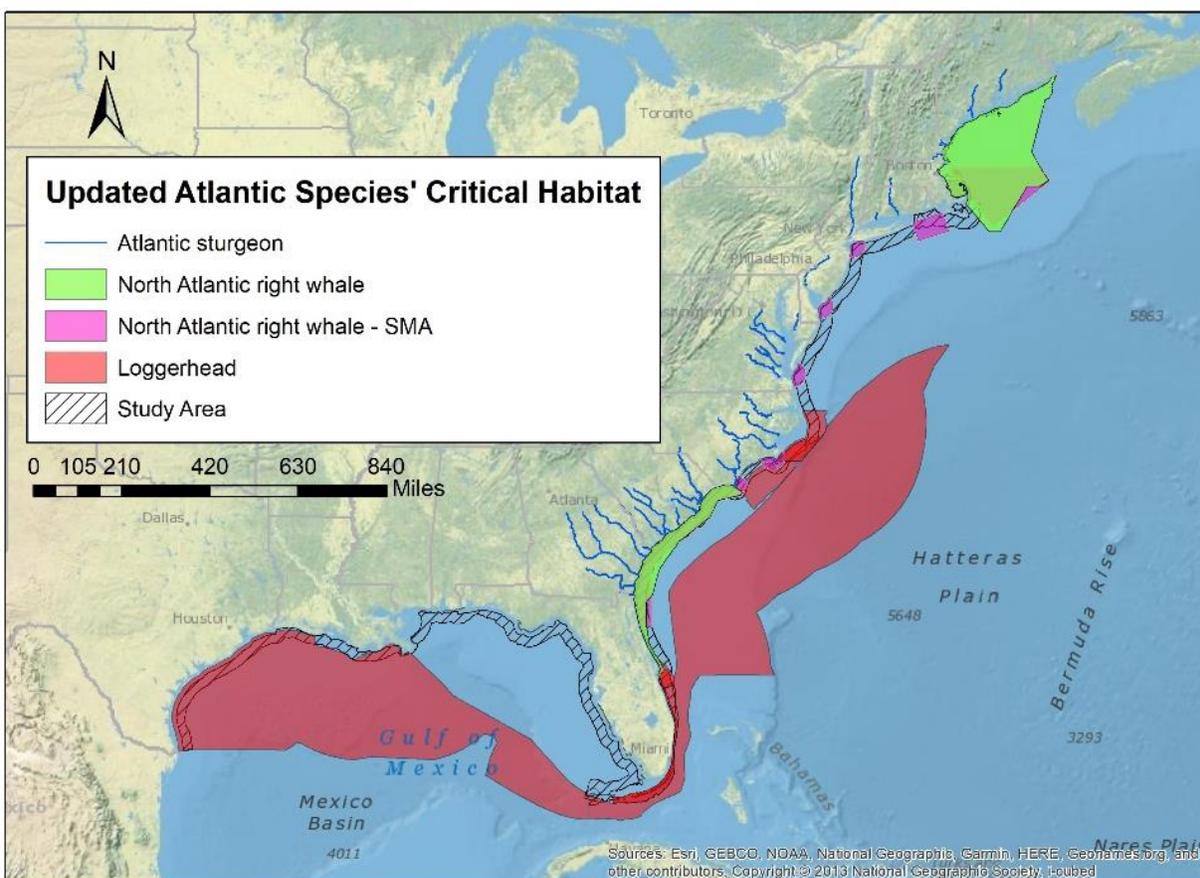


Figure 3-1. Critical Habitat Updates for Atlantic Species

Various impacts to marine mammals from similar sand survey activities were analyzed extensively by BOEM (2014b), but updates have occurred for acoustic impacts. Anthropogenic noises can disrupt animal movement, communication, foraging, and spawning (Hawkins and Popper 2016, Popper and Fay 2011, Southall et al. 2007). Acoustic impacts from geophysical and geological surveys to marine animals have been analyzed extensively (BOEM 2017, BOEM 2014b, BOEM 2012), with multiple mitigations commonly applied, particularly for the North Atlantic right whale (Appendix B). Appendix A provides additional detail on the acoustic characteristics of survey equipment. Briefly, the level of sound in water can be expressed in several different ways, but always in terms of decibels (dB) relative to 1 microPascal (1 μ Pa). Peak pressure level is the maximum Sound Pressure Level (SPL; highest level of sound) in a

signal measured in dB re 1 μPa . The root-mean-square (rms) SPL can be thought of as a measure of the average pressure for at least 1 second, or as the “effective” pressure over the duration of an acoustic event. “Source level” refers to the rms SPL when measured at 1 meter (m) from the source. Sound Exposure Level (SEL) is the integration over time of the square of the acoustic pressure in the signal and is thus an indication of the total acoustic energy received. SEL can be used to characterize the source level or the received level and is reported as dB re 1 $\mu\text{Pa}^2 \cdot \text{s}$. Cumulative SEL represents the total SEL that may be received over the duration of an acoustic event that includes several signals. NOAA released acoustic guidance in 2016 that discusses the levels of received sound that would result in temporary or permanent threshold shifts (TTS or PTS), or changes to the lowest-amplitude sounds that an animal can detect, in five hearing groups of marine mammals (Table 3-2; NOAA 2016). The PTS serves as the basis for the onset of Level A harassment (i.e., potential to injure); Level B harassment (i.e., potential to disturb or elicit a behavioral response) occurs at 160 dB rms SPL for proposed geophysical equipment and 120 dB rms SPL for vibracoring (Appendix A).¹

Table 3-2. Marine Mammal Hearing Group Permanent Threshold Shifts (PTS) Onset (NOAA 2016)

Hearing Group	Hearing Range	Non-impulsive (dB)
		24-hr (LE,LF/MF/HF/PW/OW,24h)
Low-frequency (LF) cetaceans (baleen whales)	7 Hz – 35 kHz	199
Mid-frequency (MF) cetaceans (dolphins, toothed whales)	150 Hz – 160 kHz	198
High-frequency (HF) cetaceans (true porpoises)	275 Hz – 160 kHz	173
Phocid pinnipeds (PW) (true seals)	50 Hz – 86 kHz	201
Otariid pinnipeds (OW) (sea lions, fur seals)	60 Hz – 39 kHz	219

During geophysical surveys, non-impulsive sound sources are used to identify sand resources. Most of the technology that creates non-impulsive noise during geophysical surveys will be nominally operated above 180 kHz, beyond the hearing range of cetaceans, manatees, seals, sea turtles, and most fishes (BOEM 2014a, BOEM 2014b, BOEM 2017). Therefore, only the boomer and chirp geophysical sources are likely to be detected by marine animals. These sources would be operated at the lowest setting to minimize sound levels while still fulfilling data needs (Crocker and Fratantonio 2016). BOEM proposes that the maximum source level for a chirp or boomer source would be 205 dB rms SPL. Then, for both chirp and boomer sources, an acoustic exclusion zone (Appendix B) would effectively distance these sources from marine mammals and decrease the potential risk of a marine mammal exposed to Level A (sound levels of PTS onset in Table 3-2) or Level B (160 dB rms SPL) Harassment (Appendix A; see Table A-2). With mitigation measures, particularly the visual monitoring of an acoustic exclusion zone

¹ Southall et al. (2019) recently released updated criteria on marine mammal hearing groups and for the onset of PTS and TTS. Evaluations for this Proposed Action were done using NMFS current determinations for the onset of PTS and TTS. However, full consideration and integration of Southall et al. (2019) into this analysis is not needed as it will not substantially change the findings given: (1) the PTS/TTS criteria from NMFS used in our evaluation are more conservative (protective) than Southall et al. (2019) and (2) criteria under Southall et al. (2019) would likely decrease our already small PTS/TTS exclusion zone sizes for all sources (currently <1 m - 3 m) thus making the potential for PTS/TTS even less likely.

and startup/shutdown procedures, the effects of survey noise are expected to be short-term, localized, and negligible to minor, which is consistent with previous analyses for similar activities by BOEM (2014b).

Geological surveys (i.e., vibracores) may create some broadband (typically non-impulsive) noise, with source levels much less than 180-190 dB rms SPL and peak frequencies less than 1 kHz (Reiser et al. 2011). Generally speaking, the pneumatic or electric vibrahead would be operated for very short periods of time, between 5-10 minutes on average. Sound levels tend to decrease with increasing sediment penetration. The vibracore sampling protocol, including an acoustic exclusion zone, would minimize marine animals' (particularly marine mammals and sea turtles) exposure to sound. In one square mile, approximately 15 vibracores could be collected in a 12- to 24-hour period. Based on calculated distances to potential exposure, the mitigation measures will be applied such that impacts from geological sampling are short-term, localized, and negligible. The proposed action may affect but is not likely to adversely affect ESA-listed whales that occur in the Atlantic Study Area. Protected manatees that may occur in the Atlantic or GOM are not expected to be affected.

Fish and Essential Fish Habitat

New ESA and EFH designations have occurred since the previous analysis (BOEM 2014b). Atlantic sturgeon have five DPSs along the U.S. East Coast (77 FR 5880; 77 FR 5914). Critical habitat, designated in 31 freshwater streams in 2017, does not overlap with the Study Area (81 FR 39160; Figure 3-1). Atlantic sturgeon are commonly found along the coast. For example, in 2017, an acoustic telemetry array detected 479 Atlantic sturgeon around the Sandbridge Shoal borrow area off of Virginia Beach; the majority of these occurred from November to April (B. Hooker, pers. comm.).

The threatened scalloped hammerhead shark's (*Sphyrna lewini*) Central and Southwest DPS, listed in 2014, occurs in the Study Area in the Atlantic (79 FR 38213). This pelagic species is found in warm temperate and tropical seas from the coast to open ocean. The giant manta ray (*Manta birostris*) is a large, slow-growing filter-feeder that can be found in both shallow and pelagic waters around the world, including both the Atlantic and GOM; this species was recently listed as threatened (83 FR 2916). Another threatened species found in both the Atlantic and GOM is the oceanic whitetip shark (*Carcharhinus longimanus*), which is a long-lived pelagic species (83 FR 4153).

Noise produced by sand survey activities are beyond most fishes' hearing ranges and are therefore not expected to impact fish or EFH. Any minor behavioral changes (e.g., moving away from a sound source) would affect a very small number of fish, including protected species, and is not expected to interrupt the ability of an individual to forage, rest, or migrate, or ultimately impact an animal's fitness. Bottom disturbance and turbidity would be extremely localized and only occur briefly, so fish are not expected to be affected. Impacts to fish could be negligible to minor depending on the overlap of activities with sensitive species, which does not differ from the previous analysis of similar activities (BOEM 2014b). For fish protected under the ESA, the proposed action may affect but is not likely to adversely affect Atlantic sturgeon, giant manta rays, oceanic whitetips, and smalltooth sawfish, due to the small spatial overlap and ability of species to move away from any potential disruptions. No effects are expected for listed scalloped hammerheads.

Minor changes to EFH and Habitat Areas of Particular Concern (HAPC) designations have occurred in the Atlantic since the previous analysis by BOEM (2014b), some of which overlap with the Study Area (NEFMC 2017, NMFS 2017a). However, surveys would occur over a short duration in a localized area;

therefore, with mitigation measures to avoid sensitive habitats, impacts to EFH and HAPCs are expected to be negligible to minor (Appendix C).

Benthic Habitat and Communities

Since the previous analysis by BOEM (2014b) that included two coral species, 20 coral species were listed as threatened (79 FR 53852). Of these, five coral species (*Dendrogyra cylindrus*, *Orbicella annularis*, *Orbicella faveolata*, *Orbicella franksi*, and *Mycetophyllia ferox*) occur in the Caribbean and Southeast U.S and may overlap the Study Area. These species have either low or declining abundance, often coupled with slow growth and low recruitment. Similar to other corals, these five species are threatened by a variety of impacts like climate change, fishing, and pollution; disease and ocean warming are particularly stressful to these delicate organisms (NMFS 2015). Seafloor disruption from the proposed activity could potentially indirectly affect these five protected coral species via resuspension of sediment; however, mitigation measures would prevent activity in sensitive benthic habitats and avoid direct impacts. Therefore, negligible impacts are expected. The proposed action is not expected to affect the seven ESA-listed coral species in the Study Area.

Sea Turtles

Updates to ESA designations have occurred since BOEM's previous analysis of sand survey activities (BOEM 2014b). The threatened Northwest Atlantic DPS of loggerhead swims and forages along the entire Atlantic Coast but nests in warmer latitudes south of Virginia (NMFS 2017b). Since BOEM's most recent EA analyzing impacts of surveys to loggerhead sea turtles (BOEM 2014b), they have been listed as nine DPSs (76 FR 58868); the threatened Northwest Atlantic DPS occurs in the Study Area.

Additionally, critical habitat for loggerheads for different stages (e.g., migration) has been designated in select areas from nesting beaches to open ocean, ranging from North Carolina to Florida (79 FR 39856; Figure 3-1).

The North Atlantic threatened DPS of green turtles, listed as 11 DPSs worldwide in 2016 (81 FR 20057), ranges from Massachusetts to Florida, overlapping with the Study Area (NMFS 2016). Nesting beaches for protected green sea turtles are found in southeastern U.S. Sound sources are expected to be outside of sea turtles' hearing ranges, though some minor behavioral adjustments may occur. Impacts to sea turtles from proposed activities are expected to be negligible, because mitigation measures will decrease risks of impacts, particularly those from noise and vessel traffic, as described in Table 3-1 and previously by BOEM (2014b). As ESA-listed species, the proposed action may affect, but is not likely to adversely affect, sea turtles since mitigation measures are included to decrease acoustic impacts and vessel strike risk. Recently designated loggerhead critical habitat is not expected to be affected because proposed activities will occur over a short duration in a localized area and is not expected to impact prey species.

Marine and Coastal Birds

Since the previous analysis (BOEM 2014b), the Rufa red knot (*Calidris canutus rufa*), a coastal shorebird, was listed as threatened in 2015 (79 FR 73706). This medium-sized bird migrates between breeding areas in the Arctic to wintering areas in the U.S. Southeast, Gulf of Mexico, and points south. During both spring and fall migrations, these birds stopover to rest and forage along their path, frequenting coastal barrier islands. Because there is low spatial overlap with the proposed action, impacts to the Rufa red knot are expected to be negligible. This finding applies to other birds and bats, including protected species, in the Study Area. The proposed action is expected to have no effect on the five ESA listed birds that occur in the Study Area.

3.3.2 Gulf of Mexico

The impacts on GOM resources of certain G&G work similar to the proposed sand survey activities have been extensively analyzed by BOEM (2017). Activities could include surveys and sampling that would support development of a Gulf of Mexico portion of the National Offshore Sand Inventory conducted through BOEM-funded state cooperative agreements. While the majority of the cooperative agreements' research would be conducted on the OCS, some of the data collection activities may also occur in State waters, especially if mapping continuous geologic features. Unlike the Atlantic summary (Table 3-1) that was based on a previous analysis of similar activities (BOEM 2014b), the GOM does not have a background NEPA document to incorporate by reference; therefore, a more detailed analysis in text below establishes the GOM affected environment and impacts associated with the proposed action. Under both Alternatives A and B, certain mitigations (Appendix B) would apply to all activities in both the GOM and the Atlantic, however both Alternatives' time-area closures that would apply in the Atlantic would not apply in the GOM, because they were developed for the critically endangered North Atlantic right whale, a marine mammal which rarely occurs in the Gulf of Mexico region. As previously stated, Alternative A identifies potential impact levels. The analysis for Alternatives B and C provides contextual changes to potential impacts (e.g., more or less based on context) but unless otherwise stated, fall within the same impact level.

Biological Resources

Marine Mammals

In the GOM, there are 22 marine mammal species that may occur within the Study Area, based on current distributional data (Davis and Fargion 1996, Hayes et al. 2018, Jefferson et al. 2008, Southall et al. 2007, Waring et al. 2013, Waring et al. 2014, Waring et al. 2015, Würsig et al., 2000). These species represent two taxonomic orders: Cetacea (whales and dolphins) and Sirenia (manatees). Marine mammals within the GOM may generally be divided into a continental shelf community and an oceanic community. The continental shelf community includes two cetacean species, the common bottlenose dolphin (*Tursiops truncatus*) and the Atlantic spotted dolphin (*Stenella frontalis*). Occasional sightings of the Florida manatee occur in coastal and near-coastal waters. Oceanic cetacean species may occur within the GOM, but they are considered rare or extralimital within the Study Area (i.e., their presence would be outside of their normal distributional range [Waring et al., 2014]). As irregular inhabitants of the Study Area, they are not considered further in this analysis.

All marine mammal species within U.S. waters are protected under the MMPA. Two species, the sperm whale (*Physeter macrocephalus*) (Northern Gulf of Mexico Stock) and the Florida subspecies of the West Indian manatee, are federally listed as endangered species and receive further protection under the ESA (Waring et al. 2010). In April 2019, the GOM Bryde's whale (*Balaenoptera edeni*) was listed as endangered (84 FR 15446). Since this baleen whale is unlikely to occur within the Study Area (Hayes et al. 2018), this protected species is not expected to be impacted by sand survey activities.

Environmental Impacts

Alternative A: Proposed Action

The various marine mammal species could be exposed to sound from geophysical and geological sources used during sand survey activities. The discussion of survey-related acoustic impacts on marine animals, particularly marine mammals, in Chapter 3.3.1 applies to GOM species as well.

In addition to equipment noise, survey vessels generate noise. The dominant noise source from vessels is from propeller operation, including cavitation, singing, and propulsion, with the intensity of this noise largely related to ship size and speed. Survey vessels, which generate the most project-related vessel traffic under Alternative A, survey at a reduced speed of 3-5 kn (5.6-9.3 km/hr). This slower speed would reduce vessel-associated noise, especially related to operation and hull-wave slap.

The potential impact on marine mammal benthic food resources from physical disturbance of the seafloor is expected to be negligible based on the availability of similar undisturbed resources within the region.

With mitigation measures, as outlined in Appendix B, including speed restrictions, observer requirements, marine pollution, and marine debris guidance, the effects of project-related noise, debris and waste/discharge, and potential collisions with marine mammals within the Study Area are expected to be negligible to minor. Any potential impacts would be limited to short-term disruption of behavioral patterns or displacement of individual marine mammals from discrete areas within the Study Area. Like the manatee (refer to Chapter 3.3.1), neither the ESA-listed sperm whale nor Bryde's whale is expected to be affected by the proposed action due to both species' low likelihood of occurrence in the Study Area.

Alternative B: Additional Operational Restrictions and Time-Area Closures

The potential impacts under Alternative B on each of the marine mammal species are largely similar as the impacts described under Alternative A.

Under this alternative, the same suite and level of survey activities would occur but with additional restrictions, which may result in more vessel trips. Sequential sand surveys with multiple mobilizations could lead to increased noise exposure and a greater chance for vessel collisions or debris interactions to occur relative to Alternative A, though impacts are still expected to be negligible to minor.

Alternative C: No Action Alternative

Under the No Action Alternative, sand survey activities would be limited. Because there would be less noise, vessel traffic, or seafloor disruption, there would be fewer impacts to marine mammals.

Fish and EFH

The GOM Study Area's marine habitats encompass coastal marshes, shelf demersal habitat, and pelagic habitat, supporting an abundant and diverse group of fishes. Individual fish species distributions vary in relation to environmental factors such as water depth, salinity, temperature, and habitat type. Many commercial fish species spend all or part of their life cycle in the Study Area, resulting in a high density of EFH in the Study Area (Appendix C).

Though two protected fish species (Gulf sturgeon [*Acipenser oxyrinchus desotoi*] and smalltooth sawfish) are found near the Study Area, they inhabit and have critical habitat in nearshore waters. A third protected species, Nassau grouper (*Epinephalus striatus*), has been documented as a transient or rarely occurring species in the Study Area. The protected giant manta ray and oceanic whitetip shark, described in Chapter 3.3.1 of the Atlantic, are also found in the GOM but are migratory pelagic species that occur sporadically offshore. All of these species are considered to experience negligible to minor impacts due to the proposed action because they have a low likelihood of overlap with the activities and associated impact producing factors.

Fish species in the Study Area most likely to be impacted by the proposed activities include soft bottom fishes and coastal pelagic fishes. The demersal or bottom-dwelling fish fauna of the continental shelf separate broadly into soft bottom and hard bottom assemblages. The soft bottom fish fauna varies both along (east to west) and across (north to south) the GOM shelf (Chittenden and McEachran 1976, Darnell et al. 1983, Darnell and Kleypas 1987). Environmental factors like sedimentary characteristics, water temperature, dissolved oxygen, salinity, and water depth influence the distribution and abundance of soft bottom fishes (e.g., Switzer et al., 2006). In the eastern GOM (primarily the expansive west Florida shelf), relatively clear water and coarse carbonate sediments on the open shelf support seabasses, mojarras, porgies, grunts, and sand flounders. The west Florida shelf also has vast areas of soft bottom covered by seagrasses and macroalgae. West of the Florida Panhandle, carbonate sediments of the open shelf give way to more coarse sand and shell hash. Here, in water depths ranging from 20-40 m (66-131 ft) from Alabama to west of the Mississippi River delta, soft bottom fish assemblages are composed of searobins, seabasses, porgies, flatfishes, goatfishes, and snake eels. This particular horizon extends in a semi-continuous fashion to the west Texas shelf. In coastal waters from 20 m (66 ft) to the shoreline, sediments become fine and muddy, reflecting the massive discharges of Mobile Bay, the Mississippi River, and Atchafalaya River. This region, which is centered on the Mississippi River delta and often called the “fertile crescent,” supports a dense assemblage of catfishes, cutlassfish, croaker, seatrout, and other drums.

The primary water column fish assemblage found in coastal and shelf waters of the GOM is termed coastal pelagic. Major coastal pelagic fishes occurring in the GOM are sharks, rays, ladyfish, anchovies, herrings, mackerels, jacks, mullets, bluefish (*Pomatomus saltatrix*), and cobia (*Rachycentron canadum*). The distribution of most species depends upon water column structure in temperature, salinity, and dissolved oxygen, which vary spatially and seasonally. The species discussed thus far are inhabitants of the open shelf in water depths >10 m (33 ft).

Fishery resources within the Study Area are primarily managed by the Gulf of Mexico Fishery Management Council (GMFMC) in seven Fishery Management Plans (FMPs), which manage 182 fishery species. Migratory pelagic fish species are jointly managed by the GMFMC and South Atlantic Fishery Management Council (SAFMC). In addition to regional FMPs, the National Marine Fisheries Service (NMFS) manages 39 highly migratory species that occur in the GOM. The aforementioned species all occur in the GOM for at least a portion of their life cycles. Habitat Areas of Particular Concern (HAPCs) are located within the defined Study Area for all life stages as outlined by the management entities.

Environmental Impacts

Alternative A: Proposed Action

Sound sources associated with the proposed action generate noise that may elicit behavioral responses, mask sounds, or result in physical effects or mortality on fishes. The severity of these effects relates to sound levels and frequencies, distance from sound source, and species-specific hearing sensitivity. In general, fishes would be most susceptible to low-frequency sound sources, such as sub-bottom profilers. The use of electromechanical sources would be mostly from moving vessels, and individual surveys would be temporary and spatially limited. The potential for impacts as a result of sound emitted from the vibracore would be localized and short in duration. Seafloor disturbance from the placement of anchors and bottom sampling using grab samplers and/or cores would avoid sensitive hard bottom; therefore, associated fish resources will be avoided based on mitigations (Appendix B). Bottom disturbance in

other areas (e.g., soft bottom) would make direct contact with the seafloor; the removal or decrease of benthic prey resources may temporarily displace bottom-feeding fishes from a small area. Fishes are expected to find available foraging grounds nearby. Pelagic and highly migratory species are transient and mobile, such that noise impacts would be temporary and avoidable. Since this group is not associated with the seafloor, bottom-disturbing activities would not create impacts.

Since seafloor disturbance by projected survey activities would be highly localized, temporary, and short-term, and noise stress would be mitigated, the impacts on demersal soft bottom fish resources and associated EFH are expected to be negligible to minor. The impacts on pelagic and highly migratory fish resources and associated EFH are expected to be negligible to minor. In addition to the protected fish species that occur in both the Atlantic and GOM (Chapter 3.3.1), the proposed action may affect but is not likely to adversely affect the Gulf sturgeon and Nassau grouper due to the low spatial overlap.

Alternative B: Additional Operational Restrictions

Under this alternative, the same suite and level of survey activities would occur but with additional restrictions, which may avoid HAPCs and other sensitive areas. This may also require sequential surveys with multiple mobilizations to an area. While there could be additional vessel presence and noise as a result, bottom-disturbing activities are not expected to increase. Additional mobilizations would increase the potential impacts of vessel noise to fish resources and EFH under Alternative B relative to Alternative A; however, impacts from noise and bottom disturbance would still be considered negligible to minor.

Alternative C: No Action Alternative

Under the No Action Alternative, the proposed action would be limited; therefore, there would be fewer impacts on fish resources and EFH.

Benthic Habitat and Communities

The study area encompasses a number of habitats in OCS water less than 50 m (164 ft) along the five states bordering the Gulf Mexico. Across the GOM, the slope and shelf consists of fine, muddy, and sandy sediments that support high-diversity, low-density benthic communities (Rowe and Kennicutt 2001). Sediments in the eastern Gulf of Mexico consist primarily of sand, while sand, silt and clay dominate sediment in the central and western Gulf of Mexico (Brooks and Darnell 1991). Grain size is the most important substrate characteristic affecting the distribution of benthic fauna (Vittor 2000). While less common than ubiquitous soft-bottom environments in the GOM, hard bottom environments are scattered across the Gulf of Mexico, with low-relief hard and live bottom habitats concentrated in the central and eastern GOM. Hard bottom areas made of sedimentary rock are found in shallow waters (18-40 m [60-130 ft]) along the inner and middle Mississippi-Alabama shelf. These hard bottom areas include many different habitat types, including reef-like structures, rubble fields, flat rocks, limestone ledges, rocky outcrops, and clustered reefs, among others (Schroeder 2000). Along the West Florida Shelf, which is composed of siliciclastic and carbonate sediments, diverse coral habitats are interspersed and support a variety of invertebrates and fishes (GMFMC 2016).

Ephemeral hard bottom exists in many areas due to seasonally shifting sands that periodically expose the underlying bedrock. Faunal cover is usually limited on these ephemeral hard bottom patches, but some species of sea whips and gorgonians can grow quickly enough and survive despite occasional partial burial (BOEM 2012, BOEM 2013a). The seven coral species protected under the ESA described in the Atlantic (Chapter 3.3.1) also occur in the Gulf of Mexico.

Environmental Impacts

Alternative A: Proposed Action

Implementation of the proposed action would result in short-term, negligible, direct and indirect impacts on soft bottom benthic resources, primarily through seafloor disturbance. Under the proposed action, seafloor disturbance would occur due to geologic sampling or anchoring. Direct mortality of benthic organisms could occur in areas of seafloor disturbance, such as during geologic sampling or anchoring. However, the disturbed areas would be limited to the size of the sampling gear or anchor and sampling would be spaced out so that impacts on benthic communities would be localized and limited. Effects on benthos from seafloor disturbance would be greatest among species with low mobility or those that are sessile, which include echinoderms.

The potential impacts on benthic communities from survey noise are thoroughly discussed in BOEM (2017). While some available data assessing physiological effects or biochemical responses of marine invertebrates to acoustic noise do not indicate serious pathological or physiological effects (LGL 2011), other species may experience impacts (Wale et al. 2013). Based on results of studies of invertebrate communities following acoustic exposure, only limited impacts on benthic organisms would be expected to be detectable, especially given the short duration of sound exposure, and no overall changes in species composition, community structure, and/or ecological functioning benthic communities are expected.

Sensitive areas like live or hard bottoms (e.g., coral reefs, worm reefs, and artificial reefs) would be avoided to protect these resources and also because sand resources would not be present or extractable in these areas (Appendix B). Seafloor disturbance could result in very localized and short-term sediment resuspension, some of which could extend beyond the footprint of the bottom sampling, leading to short-term, indirect effects that could impact the benthic community due to the burial of adults/recruits (Miller et al. 2002) and/or the temporary prevention of effective suspension feeding (Rhoads and Young 1970).

No ESA-listed corals, unlisted corals, or other hard/live bottom communities are likely to be impacted because BOEM will separate bottom-disturbing activity from sensitive seafloor features. Potential impacts from sand surveys on soft bottom benthic communities under this alternative would not be detectable and therefore would be negligible.

Alternative B: Additional Operational Restrictions

Impacts on benthic resources from Alternative B would be similar to, or slightly less than, those described for Alternative A because there would be additional screening before geological sampling. The number of geological samples anticipated to occur under Alternative B is expected to be the same as those for the proposed action. Therefore, the area of seafloor disturbance (and thus, impact) would be essentially the same as the proposed action.

Alternative C: No Action Alternative

Under the No Action Alternative, sand survey activities would be limited. Because there would be fewer seafloor-disturbing activities, there would be fewer impacts to benthic resources.

Sea Turtles

Five species of sea turtles (i.e., loggerhead, green, Kemp's ridley, hawksbill, and leatherback) occur at least seasonally in the northern GOM; all are listed as threatened or endangered under the ESA. Three types of critical habitat, all for loggerhead (Figure 3-1), are found in the northern GOM: breeding critical habitat in the GOM is restricted to the waters extending from the Florida Strait to the Dry Tortugas;

nearshore reproductive critical habitat is located in the waters of Mississippi, Alabama, and Florida; and *Sargassum* critical habitat is located in the oceanic waters of the Study Area.

Environmental Impacts

Alternative A: Proposed Action

Sea turtles are thought to detect low-frequency sound, with an expected hearing range with a peak sensitivity of 200-700 Hz. However, the potential effects of sound exposure on sea turtle biology and behavior remain largely unknown (Samuel et al. 2005). Without the implementation of monitoring and mitigation measures, active acoustic sound sources could have a range of effects on sea turtles, including physical injury, hearing threshold shift, auditory masking, and behavioral responses.

The exposure of sea turtles to sound from the sand surveys would largely be avoided with the proposed mitigations implemented. Some hearing sensitivity at lower received levels, though, may result in temporary and localized exposure and is based on the audibility of the source to sea turtles (which is a function of both hearing ability and distance between the source and the turtle[s]), in addition to the duration of the surveys. Any behavioral response, potentially including avoidance, changes in dive patterns or course, or changes in foraging behavior, would be very brief and limited to the area of ensonification (or area that fills with sound). There is not expected to be any increase in energy expenditure that has any detectable effect on the physiology of any individuals or any future effect on growth, reproduction, or general health. Sound generated from the sand survey activities will primarily take place at least 3 nmi (5.6 km) offshore and would therefore have negligible impacts on nesting or nearshore foraging sea turtles. Vessel and equipment noise from the proposed action would contribute incrementally to overall ambient noise levels within the Study Area. Proposed mitigations (Appendix B), visual monitoring coupled with restrictions on noise and speed, would be expected to decrease these risks to a negligible impact on sea turtles. As described in Chapter 3.3.1, the proposed activities may affect, but are not likely to adversely affect, sea turtles.

Alternative B: Additional Operational Restrictions

Alternative B may result in decreased acoustic exposure of some sea turtles, but it may also increase the number of mobilizations. Multiple mobilizations may alternatively add marine noise and a greater chance for vessel collisions compared to Alternative A. Impacts, however, are still expected to be negligible.

Alternative C: No Action Alternative

Under the No Action Alternative, the proposed action would be limited, and there would be fewer potential impacts to sea turtles.

Marine and Coastal Birds

The GOM supports diverse avifauna and includes members from three taxonomic orders: Charadriiformes (gulls and terns); Pelicaniformes (pelicans, frigatebirds, gannets, boobies, tropicbirds, and cormorants); and Procellariiformes (petrels, storm petrels, and shearwaters). Certain waterfowl taxa commonly termed sea ducks (Order Anseriformes) feed and rest within coastal (nearshore and inshore) waters outside of their breeding seasons. Members of the order Gaviiformes (loons) may also be present in coastal waters. Of the two threatened and endangered species of marine and coastal birds within the Study Area, piping plover and roseate tern, the roseate terns are the only species that forage offshore and feed by plunge-diving, often submerging completely when diving for fish.

Environmental Impacts

Alternative A: The Proposed Action

Marine and coastal birds would be most susceptible to impacts from the use of the proposed survey equipment when seabirds and waterfowl dive below the water surface and would be exposed to underwater noise (Turnpenny and Nedwell 1994). The noise generated by individual vessels, engine noise, propeller cavitation, and proposed geophysical survey equipment (e.g., sub-bottom profilers) would fall within the airborne hearing range of birds, whereas noise generated by other types of survey equipment would be outside of their airborne hearing range and is likely to be inaudible to birds underwater. Impacts would be minimized as the level of vessel activity per survey event is not expected to substantially increase the background vessel noise. The vessels move at slow speeds, minimizing source levels, and noise levels dissipate quickly with distance from the vessel. Based on these measures and the lower-frequency equipment used for sand surveys, it is expected that there would be no mortality or life-threatening injury and limited disruption of behavioral patterns or other effects on diving seabirds or waterfowl, resulting in a negligible to minor impact. As was concluded for the Atlantic, ESA-listed birds would not be affected by the proposed action.

Alternative B: Additional Operational Restrictions

If multiple mobilizations to the same area are required under this alternative, it is possible that increased impacts on avian resources could occur from increased disturbance but it would otherwise be similar to impacts from Alternative A.

Alternative C: No Action Alternative

Under the No Action Alternative, the proposed action would be limited and there would be fewer vessels and less noise causing disturbances to avian resources, resulting in fewer impacts.

Sociocultural Resources

Historic/Pre-Contact Resources

Submerged cultural resources within the Study Area include shipwrecks dating from the 16th and 17th centuries during European exploration and settlement of North America to those associated with World War II and the Cold War. Submerged pre-contact period sites and landforms with the potential to contain these sites, dating between 14,550 and 7,500 B.P. (the beginning of the Paleoindian through the end of the Early Archaic culture periods), may also be present within the Study Area, depending on regional landform and sea-level rise variation (Halligan et al. 2016).

Based on the current understanding of sea level rise and the earliest date of human occupation, any existing pre-contact period sites on the OCS would be located in the nearshore zone (<60 m [197 ft] water depth). Additionally, pre-contact period sites would be most likely found in the vicinity of paleo-channels or river terraces that offer the highest potential of site preservation; however, preservation conditions are variable and depend on local geomorphological conditions and the speed of sea-level rise. Current research also indicates that historic period shipwrecks and aircraft could be located within any portion of the Study Area.

Environmental Impacts

Alternative A: Proposed Action

Because of the rich maritime history and potential for submerged pre-contact resources in the Study Area, all activities that disturb the seafloor have the potential to impact previously unrecorded cultural

resources. Potential impacts on cultural resources resulting from sand survey activities would likely be associated with geological sampling and anchoring. Bottom sampling, coring activities, anchor placement, and anchor dragging across the seafloor have the potential to damage archaeological resources. Areas identified during geophysical surveys as having archaeological resources would be assigned an avoidance buffer zone for all activities. Adherence to mitigation measures, as outlined in Appendix B, ensures that historic and pre-contact period submerged cultural resources would not be impacted.

Alternative B: Additional Operational Restrictions

Impacts would be similar to those discussed under Alternative A. Since sites would be cleared in advance, there may be a slight decrease in the possibility of anchoring or other seafloor-disturbing activities that could impact submerged cultural resources. As stated above, however, adherence to mitigation measures ensures that submerged cultural resources would not be impacted.

Alternative C: No Action Alternative

Under the No Action Alternative, limited sand survey activities would be conducted. It is anticipated that any surveys would adhere to similar avoidance mitigations proposed for Alternatives A and B such that impacts to historic or pre-contact period cultural resources would not occur.

Recreational and Commercial Fishing

The Study Area supports regionally and nationally important commercial and recreational fisheries. Commercial fisheries support not only numerous directly related jobs (e.g., fishing crews) but also many indirectly related industries (e.g., seafood distributors, restaurants, and suppliers of commercial fishing gear). Because the fishing industry is so integrated with local business, these commercial fishing ports often support entire coastal fishing communities.

Environmental Impacts

Alternative A: Proposed Action

Potential multiple-use effects on recreational and commercial fishing include short-term displacement of fishing activities and potential damage to fishing equipment. Any physical disturbance in the ocean or on the ocean floor, such as deployment of the vibrocore rig, use of a towed system, or anchoring could inadvertently damage submerged fishing equipment and gear. Areas in which commercial and recreational fishermen would be temporarily excluded are relatively small in relation to the overall fishing grounds, and required changes to navigation necessary to reach fishing areas are expected to be minimal. BOEM would require survey vessels to report Automatic Information System (AIS) location data real time, be flagged and use USCG lighting schemes during survey activities, communicate with observed fishing vessels, and avoid observed fishing gear by a minimum distance. Any effect on fishing would be further minimized to negligible levels with advance public notification through the use of Notices to Mariners and other mitigations (Appendix B).

Alternative B: Additional Operational Restrictions

Alternative B could increase vessel traffic for sequential surveys, which could add a temporary exclusion of fishermen from fishing grounds. However, these impacts would be short-term and negligible.

Alternative C: No Action Alternative

Under the No Action Alternative, the proposed action would be limited. There would be fewer impacts on recreational and commercial fishing.

Multiple-Use Conflicts

Other uses of the Study Area, as identified by the Marine Cadastre (2018) include shipping and marine traffic, commercial traffic from seven deepwater commercial ports, military warning areas, sand and gravel mining, ocean dredged material disposal, and oil and gas exploration and production. Most of the Study Area is within a military warning area that allows military forces to conduct training and testing activities. Military activities can include various air-to-air, air to-surface, and surface-to-surface Naval fleet training, submarine and antisubmarine training, and Air Force exercises. There are also 26 sites that contain unexploded ordnances, submerged explosives, depth charges, torpedoes, or other obstructions; or that are identified as discontinued dump sites for explosives or other wastes. These hazard areas are distributed across the GOM Study Area, cumulatively covering 8,943 km² (3,453 mi²) of seafloor. Lastly, an extensive network of wells and pipelines in the GOM support oil and gas exploration and development by carrying oil and gas from offshore to refineries and terminals onshore.

Environmental Impacts

Alternative A: Proposed Action

Impacts on other activities in the GOM could occur as a result of the incremental increase in vessel traffic from sand survey vessels, but the effect is expected to be negligible to minor and short-term given the limited footprint and duration of the survey activity. The few comparatively small and highly maneuverable survey vessels that would be used during sand survey activities would not measurably increase vessel traffic density or hinder other uses of the OCS. Prior to geological surveys, reconnaissance and coordination would be undertaken in areas known to contain oil and gas infrastructure, including pipelines, to reduce the likelihood of encounter during surveys.

Alternative B: Additional Operational Restrictions

Under Alternative B, sequential, additional mobilizations and vessel traffic may be needed, which may increase impacts on marine transportation and potentially other uses of the OCS relative to impacts discussed in Alternative A. However, impacts are expected to be short-term and negligible to minor.

Alternative C: No Action Alternative

Under Alternative C, the proposed action would be limited; therefore, fewer impacts on other uses of the OCS would be anticipated.

3.4 CUMULATIVE EFFECTS

Cumulative effects as applied in NEPA are an incremental environmental impact of the proposed action relative to other reasonably foreseeable actions (40 CFR § 1508.7); these impacts may result from the accumulation or synergism of effects. The past, present, and reasonably foreseeable future actions that could contribute to cumulative effects in the spatial footprint of the proposed action include those listed below.

- *Oil and Gas:* The GOM has a well-developed industry, while the Atlantic has no current oil and gas activity. Areas of the Atlantic and GOM have been proposed for exploration and development under the 2019-2024 Draft Proposed Program (BOEM 2018).
- *Renewable Energy:* The first commercial wind turbines have been constructed in Rhode Island state waters, and it is possible that further development could occur in Federal waters, particularly those in the Atlantic.

- *Marine Minerals*: Sand dredging for beach nourishment has generally occurred at depths of 10-30 m (33-98 ft) from New Jersey to Florida and Mississippi to Louisiana, and is expected to continue, with possible increases. Sand surveys similar to those proposed here may occur by states, localities, or the Federal agencies such as the U.S. Army Corps of Engineers. The MMP will continue to compile and share data so that survey efforts are not repeated.
- *Marine Transportation*: Increases in activities, like shipping, are expected to occur.
- *Commercial and Recreational Fishing*: Despite seasonal and regional variation, activities are expected to continue at the same rate since no major changes in regulations or stock sizes are anticipated.
- *Military and Space Program*: Current levels of activity in military range complexes and at Federal space facilities are expected to continue at the same rate.
- *Dredged Material Disposal*: Disposal of material dredged during the maintenance of harbors or ports are expected to continue to be placed in offshore sites at the current level.
- *New Cable Infrastructure*: Additional cables could be added to the OCS as demand increases.

Climate change may result in environmental impacts over the next century, including: altered migratory routes and timing for fish, marine mammals, and migratory birds; changes in shoreline configuration that could adversely affect sea turtle, shorebird, and seabird nesting beaches that may then lead to increased levels of beach restoration activity and increased use of OCS sand resources; changes in estuaries and coastal habitats due to interactive effects of climate change, development, and pollution; and impacts on calcification in plankton, corals, shellfish, and other marine organisms due to ocean acidification.

Various activities and processes, both natural and anthropogenic, combine to form the sound profile within the ocean, generally referred to as ambient (background) ocean noise (Richardson et al. 1995; Hildebrand 2009). Noise-related impacts associated with the cumulative activities scenario are expected to range from negligible to moderate in the Study Area. Localized, short-term, minor to moderate noise impacts might be realized in association with specific military activities (e.g., sonars), sand dredging, commercial fishing, air gun surveys, and shipping traffic; however, applicable mitigation measures (e.g., observation and clearance of safety zones) should minimize noise impacts from these acoustic sources to the extent possible. In this context, active acoustic noise sources and vessel and equipment noise from the proposed action would contribute to overall ambient noise levels within the Study Area, and the application of mitigation measures is expected to maintain acoustic exposure to negligible to minor levels for sensitive marine mammals and sea turtles.

In addition to climate change and noise, vessel traffic, discharges, and seafloor disturbance may also result in cumulative effects from the proposed action. Vessel traffic, including shipping, fishing, and dredging, concentrates around ports located on the Atlantic and GOM. While the proposed action would add to traffic, it would be a negligible incremental impact relative to all marine vessel traffic in a given area. Survey vessels generally operate at slower speeds than most other vessels, which would be expected to reduce impacts. Though small, an increase in vessels leads to an increased risk of collision and fuel spill. If a fuel spill occurred in an area with a sensitive habitat or species (e.g., corals), however, there could be minor to moderate impacts depending on other physical and environmental factors. Though vessel discharges, trash, and debris may be released into offshore waters, regulations and mitigations are

expected to minimize impacts to a negligible level. Seafloor habitat and resources (especially archaeological) may be impacted by disruptions like anchors, dredging, and storms. BOEM's proposed seafloor-disturbing activities would not occur in sensitive habitats or archaeological sites because typically geophysical surveys are conducted initially, with geological samples then selected to avoid impacts to cultural resources. Moreover, BOEM would require strict clearance and avoidance requirements to ensure that sensitive bottom habitats and cultural resources are not otherwise affected. The incremental impact of the proposed action on seafloor resources in context of the cumulative activities scenario is expected to be negligible.

4 Consultation and Coordination

BOEM notified potentially interested parties of the availability of this EA (posted online) using a contact list that BOEM maintains for similar projects in the Atlantic and Gulf of Mexico regions. Coordination and correspondence for all environmental compliance is compiled in Appendices C, D, and E. Any new requirements or mitigation measures resulting from these consultations have been incorporated into the proposed action.

The **Coastal Zone Management Act** (CZMA; 16 U.S.C. §§ 1451 *et seq.*) was enacted to protect the coastal environment from increasing demands associated with commercial, industrial, recreational, and residential uses, including Federal and State development. If an activity would have direct, indirect, or cumulative effects, the activity is subject to Federal consistency. Federal agency activities must be “consistent to the maximum extent practicable” with relevant enforceable policies of a State’s federally approved coastal management programs (15 CFR part 930 subpart C). In accordance with these requirements, BOEM prepared Consistency Determinations for 18 affected states describing potential impacts on their coastal zones from implementing the proposed action. States provided concurrence, or if not, concurrence was presumed; therefore, all proposed activities are compliant with the CZMA (Appendix E).

BOEM initiated an informal consultation with NMFS and the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 7 of the **Endangered Species Act** (ESA) and implementing regulations (50 CFR part 402). BOEM determined that the proposed action is not likely to adversely affect or will have no effect on listed species and their critical habitats. This EA and associated mitigation suite were used to support informal Section 7 consultations in lieu of preparing a separate Biological Assessment. NMFS concluded that proposed activities are not likely to adversely affect or would have no effect on protected species via a letter (February 1, 2019). The U.S. Fish and Wildlife Service also agreed with BOEM’s conclusions that the activities are not likely to affect or would have no effect on species under their jurisdiction by emails from both the northeast (August 27, 2018) and southeast (October 10, 2018). All correspondence is in Appendix E.

Based on survey parameters, survey duration, and a comprehensive suite of mitigation measures, BOEM has determined that marine mammals are very unlikely to experience Level A or B harassment as defined by the **Marine Mammal Protection Act** (MMPA).

BOEM determined that the proposed action may affect EFH, which is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” under Section 305 of the **Magnuson-Stevens Fishery Conservation and Management Act** (MSFCMA). BOEM consulted with NMFS regarding potential effects on EFH in accordance with 50 CFR part 600, using this EA, along with the EFH Assessment. NMFS provided Conservation Recommendations via a letter (November 20, 2018), which BOEM has adopted (Appendix C).

In accordance with the **National Historic Preservation Act** (NHPA; 16 U.S.C. § 470), Federal agencies are required to consider the effect of their undertakings on historic properties. BOEM, pursuant to 36 CFR § 800.4(g), prepared a Finding of No Historic Properties Affected document (Appendix D). The Finding explains the undertaking in more detail with regard to historic properties and provides BOEM’s rationale for choosing the area of potential affect, the archaeological identification efforts that will be conducted prior to any bottom disturbance, and the mitigation measures that will be in place to ensure that historic properties are not affected during bottom-disturbing activities. Letters and a copy of the Finding were sent to the Advisory Council on Historic Properties, State Historic Preservation Officers, and Federally or State-recognized Tribes, requesting comments and concurrence with the determination. To satisfy the public participation requirement of the Section 106 process (36 CFR § 800.2(d)(2)), BOEM posted the Finding to its website and issued a notice in the *Federal Register*.

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7 Appendices

A – DESCRIPTION OF EQUIPMENT

B – SURVEY REQUIREMENTS AND MITIGATION MEASURES

C – ESSENTIAL FISH HABITAT CONSULTATION

D – FINDING OF NO HISTORIC PROPERTIES AFFECTED

E – CONSULTATION AND COORDINATION



The Department of the Interior Mission

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

The Bureau of Ocean Energy Management Mission

The Bureau of Ocean Energy Management (BOEM) is responsible for managing development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.