UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT
GULF OF AMERICA REGION
NEW ORLEANS, LOUISIANA

SITE-SPECIFIC ENVIRONMENTAL ASSESSMENT

OF

GEOLOGICAL & GEOPHYSICAL SURVEY APPLICATION NO. L25-017

FOR

FUGRO USA MARINE INC.

August 1, 2025

RELATED ENVIRONMENTAL DOCUMENTS

Gulf of Mexico OCS Proposed Geological and Geophysical Activities
Western, Central, and Eastern Planning Areas, Final Programmatic Environmental Impact Statement
(OCS EIS/EA BOEM 2017-051)

Gulf of Mexico OCS Oil and Gas Lease Sales: 2017-2022
Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261
Final Environmental Impact Statement
(OCS EIS/EA BOEM 2017-009)

Gulf of Mexico OCS Lease Sale, Final Supplemental Environmental Impact Statement 2018
(OCS EIS/EA BOEM 2017-074)

Biological Opinion Oil and Gas Leasing, Exploration, Development, Production, Decommissioning, and All Related Activities in the Gulf of Mexico Outer Continental Shelf
(FWS April 20, 2018)

Biological Environmental Background Report for the Gulf of Mexico OCS Region
(OCS Report 2021-015)

Gulf of Mexico OCS Oil and Gas Lease Sales 259 and 261: Final Supplemental Environmental Impact Statement
(OCS EIS/EA BOEM 2023-001)

Final Rule: Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Geophysical Surveys in the Gulf of Mexico
(NMFS April 24, 2024)

Biological and Conference Opinion on Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement's Oil and Gas Program Activities in the Gulf of America
(NMFS May 20, 2025)

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

The Bureau of Ocean Energy Management (BOEM) has prepared a Site-Specific Environmental Assessment (SEA) (L25-017) complying with the National Environmental Policy Act (NEPA) at 42 United States Code (U.S.C.) §§ 4321 et seq. The United States Department of the Interior (DOI) NEPA implementing regulations at 43 Code of Federal Regulations (CFR) Part 46 and BOEM policy require an evaluation of proposed major Federal actions, which under BOEM jurisdiction includes oil and gas exploration or development activity on the Outer Continental Shelf (OCS).

Secretary of the Interior Doug Burgum issued Secretary's Order 3423, which directed the renaming of the Gulf of Mexico to the Gulf of America. As a result, BOEM updated existing content while legacy content such as previously published reports, studies, and NEPA documents remain unchanged.

The potential effects or impacts caused by similar actions to that proposed were examined at a basin-wide scale in the:

- Gulf of Mexico OCS Proposed Geological and Geophysical Activities Western, Central, and Eastern Planning Areas Final Programmatic Environmental Impact Statement (GOM G&G PEIS) (OCS EIS/EA BOEM 2017-051)
- Gulf of Mexico OCS Oil and Gas Lease Sales: 2017-2022: Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261 Final Environmental Impact Statement (Multisale EIS) (OCS EIS/EA BOEM 2017-009)
- Gulf of Mexico Lease Sale Final Supplemental Environmental Impact Statement 2018 (2018 SEIS) (OCS EIS/EA BOEM 2017-074)
- Biological Environmental Background Report for the Gulf of Mexico OCS Region (2021 BEBR) (OCS Report 2021-015).
- Gulf of Mexico OCS Oil and Gas Lease Sales 259 and 261: Final Supplemental Environmental Impact Statement 2023 (2023 SEIS) (OCS EIS/EA BOEM 2023-001)
- Biological Opinion Oil and Gas Leasing, Exploration, Development, Production, Decommissioning, and All Related Activities in the Gulf of Mexico Outer Continental Shelf (FWS 2018 BO) (Issued by United States Fish and Wildlife Service [FWS] April 20, 2018)
- Final Rule: Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Geophysical Surveys in the Gulf of Mexico (Issued by NMFS April 24, 2024)
- Biological and Conference Opinion on Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement's Oil and Gas Program Activities in the Gulf of America (2025 NMFS BiOp) (Issued by National Marine Fisheries Service [NMFS] May 20, 2025)

This SEA tiers from these evaluations and considers the impacts of the proposed action.

Proposed Action: Fugro USA Marine Inc. (Fugro) proposes to conduct integration testing of a high-resolution 3D seismic acquisition system utilizing airgun arrays and ocean bottom nodes (OBNs). The OBNs will be placed on the seafloor and recovered using a remote operational vehicle (ROV). The vessel *Holiday Chouest* will be utilized for the integration testing. The proposed activities are located south of Louisiana in the Central Planning Area. The proposed testing area will be within OCS block West Delta 124.

The area of the proposed action is approximately 16 miles (26 kilometers) from the nearest shoreline and in water depths of approximately 295 feet (ft) (90 meters [m]). Site-specific analysis was completed using Fugro's description of the proposed operations; however, specific technical information regarding the geological and geophysical (G&G) activities described in the permit application is proprietary and therefore is not included in this document. The proposed survey is expected to take approximately 8 days to complete and will begin in August 2025.

Factors Considered in this Determination: The impacts from the proposed action are further analyzed at the site-specific level in this Environmental Assessment. The impact analysis for the proposed activity focused on the geological and geophysical activities and the resources that may be potentially impacted. The impact producing factors (IPF) include: (1) active acoustic sound sources, (2) seafloor disturbance, (3) vessel noise, (4) vessel traffic, and (5) marine trash and debris.

In this SEA, BOEM has considered three alternatives: (1) No Action, (2) Proposed Action as Submitted, and (3) Proposed Action with Conditions of Approval (COAs). BOEM has assessed the impacts of the proposed action on the following resources:

- marine mammals
- sea turtles
- fish
- benthic communities and
- archaeological resources.

The use of an active acoustic sound source (airgun) is potentially the most disruptive impact for a free-swimming individual or groups of marine mammals, turtles, and fish in proximity to the airgun in operation. The effect of an active acoustic sound source is weighted most heavily out of all other potential impacting factors. Individual animals are vulnerable to injury if hit by the survey vessel from the proposed action. COAs include the monitoring of an exclusion zone by trained protected species observers and activation of survey shutdown requirements when mammals are observed (1) within the exclusion zone or in proximity to an active acoustic sound source, or (2) near the vessel. The application of passive acoustic monitoring, a visually/acoustically monitored exclusion zone, shutdown criteria, and vessel avoidance are designed to remove the possibility that animals and an operating airgun are located in the same place at the same time; therefore, groups or individuals are not unduly affected by underwater noise or exposed to being hit by the survey vessel. Impacts from the proposed activities to marine mammals, sea turtles, fish, benthic resources, archaeological resources, and other users have been mitigated to **nominal**. Impact significance levels are explained in **Chapter 3.1** of this SEA.

Our evaluation in this SEA has selected Alternative 3 and serves as the basis for approving the proposed action. BOEM concludes that no significant impacts are expected to occur to any affected resources by allowing the proposed activities to proceed, provided that the specific COAs and monitoring measures identified below are met by the operator.

- **COMPLIANCE WITH BIOLOGICAL OPINION TERMS AND CONDITIONS AND REASONABLE AND PRUDENT MEASURES:** This approval is conditioned upon compliance with the Reasonable and Prudent Measures and implementing Terms and Conditions of the Biological Opinion (BiOp) issued by the National Marine Fisheries Service (NMFS) on May 20, 2025 (2025 NMFS BiOp). This compliance includes mitigation, particularly any Terms and Conditions applicable to the plan, as well as record-keeping and reporting sufficient to allow BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) to comply with reporting and monitoring requirements under the BiOp, and any additional reporting required by BOEM or BSEE developed as a result of BiOp implementation. The 2025 NMFS BiOp may be found here: https://www.fisheries.noaa.gov/resource/document/biological-and-conference-opinion-bureau-ocean-energy-management-and-bureau. The BiOp Attachments and Appendices may be found here: https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.
- **OPERATIONAL NATIONAL MITIGATION PROTOCOLS FOR GEOPHYSICAL SURVEYS:** The applicant will follow the protocols provided under Attachment 1: Operational National Mitigation Protocols for Geophysical Surveys found in the 2025 NMFS BiOp. The protocols can be accessed on the National Oceanic and Atmospheric Administration (NOAA) Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.

- **MARINE DEBRIS PROTOCOL:** The applicant will follow the protocols provided under Attachment 2: Marine Debris Protocol found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.
- **VESSEL-STRIKE AVOIDANCE AND INJURED AND/OR DEAD AQUATIC PROTECTED SPECIES REPORTING PROTOCOLS:** The applicant will follow the protocols provided under Attachment 3: Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.
- **VESSEL TRANSIT WITHIN THE RICE'S WHALE AREA AS IDENTIFIED IN THE 2020 BIOLOGICAL OPINION'S REASONABLE AND PRUDENT ALTERNATIVE:** The applicant will follow the protocols provided under Attachment 4: Vessel Transit within the Rice's Whale Area as identified in the 2020 BiOp Reasonable and Prudent Alternative (2020 RWA) found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.
- **IN-WATER LINE PRECAUTION PROTOCOL:** The applicant will follow the protocols provided under Attachment 5: In-water Line Precaution Protocol found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.

- **NON-RECURRING MITIGATION FOR THE PROTECTION OF POTENTIAL ARCHAEOLOGICAL RESOURCES:** This review indicates that there may be significant archaeological sites existing within the area of ROV, 3D seismic, and OBN operations within the Federal waters of the OCS. Significant portions of the project area within the OCS have received either limited or no previous archaeological survey. These areas could contain additional archaeological materials that may be impacted by the proposed operations. All ROV operations must avoid impacting archaeological resources with the tether. One option is to use an ROV Tether Management System (TMS) to minimize entanglement risk and mitigate unnecessary seafloor contact. A second option would be to manually reduce slack in the tether during dive operations. Other options can be used if they are sufficient to actively avoid impacting archaeological sites, but they will need prior review and approval with BOEM archaeology. If you choose to develop your own tether management solution, email archaeology@boem.gov noting your application number in the subject line of the email.

  If the applicant discovers human-made debris that appears to indicate the presence of a shipwreck (e.g., a sonar image or visual confirmation of an iron, steel, or wooden hull, wooden timbers, anchors, concentrations of human-made objects, such as bottles or ceramics, piles of ballast rock, aircraft wreckage or remains) within or adjacent to the area during the proposed survey operations, the applicant will be required to immediately halt operations, take steps to ensure that the site is not disturbed in any way, and contact the BOEM Regional Supervisor of the Office of Environment within 48-hours of its discovery. The applicant must cease all operations within 1,000 feet (305 meters) of the site until the Regional Director instructs them on what steps must be taken to assess the site's potential historic significance and what steps must be taken to protect it. If an ROV impacts any submerged object, the applicant must also submit a report detailing each instance of this activity. This report should include the coordinates of the impact (to DGPS accuracy), a description of the submerged object, any damage that may have resulted from the OBN placement or retrieval operations, and any photographic and/or video imagery that is collected. The applicant must also submit a copy of any data collected as a result of these investigations.

If remote-sensing survey data is collected for any reason during the course of this project (i.e., side-scan sonar, sector-scan sonar, multi-beam bathymetry, or magnetometer), the applicant must submit copies of these data to BOEM.

Please direct any questions or correspondence pertaining to these requirements to Ms. Melanie Damour at (504) 736-2783 or by emailing archaeology@boem.gov.

- **NON-RECURRING MITIGATION BENTHIC COMMUNITIES:** BOEM review of geophysical activities proposed in L25-017 identified the potential for sensitive sessile benthic resources within the proposed node area. According to NTL 2009-G39, the minimum separation distance for bottom disturbing activities is 30 m (100 ft) from any sensitive sessile benthic community. Based on the methods described in the application, BOEM authorizes the applicant to deploy nodes with less than 30 m (100 ft) avoidance of benthic communities contingent upon the applicant adhering to the mitigations described below:
    1. All seafloor disturbances, including nodes, cables, and ROV, must remain a minimum of 5 m (16 ft) from all sensitive sessile benthic communities.
    2. The operator must photograph the seabed within a 10 m (33 ft) radius of any node placed within 30 m (100 ft) of sensitive sessile benthic communities. Photographs of each such location shall be taken pre-node deployment, post-node deployment, and post-node retrieval. The photos shall clearly show the geographic location of each node.
    3. If any sessile benthic communities are present at a proposed node location, a new site that allows compliance with the above requirements shall be selected.
    4. The operator must provide an as-placed GIS shapefile of actual OBN locations to demonstrate compliance. Submit the required photographs and shapefile to the BOEM Regional Supervisor, Office of Resource Evaluation, Data Acquisition and Special Projects Unit, within 90 calendar days after completing the G&G activity.

    If you have any question regarding this mitigation, please contact Dr. Alicia Caporaso – Benthic Ecology Lead (Alicia.Caporaso@BOEM.gov).

Conclusion: BOEM has evaluated the potential environmental impacts of the proposed action. Based on SEA No. L25-017, BOEM has determined that the proposed action with conditions of approval would have no significant impact on the marine, coastal, or human environment provided that the avoidance and mitigation measures required through conditions of approval are met by the operator. Therefore, an Environmental Impact Statement will not be required.

BRUCE CERVINI

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Date: 2025.08.01 14:27:57 -05'00'

Supervisor, Environmental Assessment Unit 2
Office of Environment
GOA OCS Region
Bureau of Ocean Energy Management

August 1, 2025
Date

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SITE-SPECIFIC ENVIRONMENTAL ASSESSMENT (SEA) PREPARED FOR FUGRO USA MARINE INC. GEOLOGICAL AND GEOPHYSICAL SURVEY APPLICATION NO. L25-017

1. INTRODUCTION

Fugro USA Marine Inc. (Fugro) has submitted a permit application (L25-017) to conduct a geological and geophysical (G&G) survey on the Outer Continental Shelf (OCS). This Site-Specific Environmental Assessment (SEA) evaluates the specific impacts associated with Fugro's proposed G&G survey activities. **Chapter 1.3** of this SEA provides specific details on the G&G activities proposed in Fugro's application.

The SEA is tiered from*:*

- Gulf of Mexico OCS Proposed Geological and Geophysical Activities Western, Central, and Eastern Planning Areas Final Programmatic Environmental Impact Statement (GOM G&G PEIS) (OCS EIS/EA BOEM 2017-051) (BOEM, 2017a)
- Gulf of Mexico OCS Oil and Gas Lease Sales: 2017-2022 Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261 Final Environmental Impact Statement (Multisale EIS) (OCS EIS/EA BOEM 2017-009) (BOEM, 2017b)
- Gulf of Mexico Lease Sale Final Supplemental Environmental Impact Statement 2018 (2018 SEIS) (OCS EIS/EA BOEM 2017-074) (BOEM, 2017c)
- Biological Opinion Oil and Gas Leasing, Exploration, Development, Production, Decommissioning, and All Related Activities in the Gulf of Mexico Outer Continental Shelf (2018 FWS BO) Issued by United States Fish and Wildlife Service [FWS] April 20, 2018 (FWS, 2018)
- Biological Environmental Background Report for the Gulf of Mexico OCS Region (2021 BEBR) (OCS Report 2021-015) (BOEM, 2021).
- Gulf of Mexico OCS Oil and Gas Lease Sales 259 and 261: Final Supplemental Environmental Impact Statement 2023 (2023 SEIS) (BOEM, 2023a)
- Final Rule: Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Geophysical Surveys in the Gulf of Mexico. Issued by NMFS April 24, 2024 (NFMS, 2024a)
- Biological and Conference Opinion on Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement's Oil and Gas Program Activities in the Gulf of America (2025 NMFS BiOp) Issued by National Marine Fisheries Service [NMFS] May 20, 2025 (NMFS, 2025a) and Appendices and Attachments (NMFS, 2025b)

"Tiering" is provided in the National Environmental Policy Act (NEPA) implementing regulations and is designed to reduce and simplify the size of environmental assessments by eliminating repetitive discussions of impacts considered in prior NEPA compliance documents, allowing analyses to focus on those site-specific concerns and effects related to the action proposed. Document tiering in the Bureau of Ocean Energy Management (BOEM) is subject to additional guidance under the United States Department of the Interior (DOI) regulations at 43 CFR § 46.140 wherein the site-specific analysis must note which conditions and effects addressed in the programmatic document remain valid and which conditions and effects require additional review.

Secretary of the Interior Doug Burgum issued Secretary's Order 3423, which directed the renaming of the Gulf of Mexico to the Gulf of America. As a result, BOEM updated existing content while legacy content such as previously published reports, studies, and NEPA documents remain unchanged.

For this SEA, all of the analyses prepared in the GOM G&G PEIS, Multisale EIS, 2018 SEIS, 2023 SEIS, 2021 BEBR, 2018 FWS BO, and 2025 NMFS BiOp (referenced hereafter as relevant NEPA compliance documents) are sufficiently comprehensive and adequate to support decision making for Fugro's proposed activities, with the following exceptions:

- **Active Acoustic Sound Sources and Vessel Noise and Traffic Impacts on Marine Mammals –** the environmental baseline since completion of the programmatic analyses may have experienced slight changes and/or new information has become available
- **Active Acoustic Sound Sources and Vessel Noise and Traffic Impacts on Sea Turtles –** the environmental baseline since completion of the programmatic analyses may have experienced slight changes and/or new information has become available
- **Active Acoustic Sound Source Impacts on Fish and Fisheries –** the environmental baseline since completion of the programmatic analyses may have experienced slight changes and/or new information has become available
- **Seafloor Disturbance –** site specific analysis is required to assess the impacts on biological features and archaeological resources that were not known during the preparation of the programmatic analyses.

Marine mammals, sea turtles, fish, benthic resources, archaeology, and commercial and recreational fisheries, as indicated in the GOM G&G PEIS, are susceptible to impacts from geophysical activities that may be considered adverse, but not significant. Impacts to fishes and commercial and recreational fisheries from the proposed activities are not expected due to the temporary nature of the operations. This SEA considers the potential for change in the status of resources and the potential for increased sensitivity of those resources to impacts from G&G activities.

Chapter 3 of this SEA will focus on new information relative to the cumulative environmental effects of this action. Where applicable, relevant affected environment discussions and impact analyses from relevant NEPA compliance documents are summarized and utilized for this site-specific analysis and are incorporated by reference into this SEA. Appropriate conditions of approval (COAs) and monitoring measures identified in the relevant NEPA compliance documents have been considered in the evaluation of the proposed action.

1.1. BACKGROUND

BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) are mandated to manage the development of OCS oil, gas, mineral resources, and renewable energy resources while ensuring safe operations and the protection of the human, marine, and coastal environments. One purpose of BOEM's regulatory program is to ensure that the G&G data is obtained in an environmentally safe manner. BOEM and BSEE regulate leasing, exploration, development, production, and decommissioning, and they perform environmental analyses during each of these phases. BOEM's Resource Evaluation Program oversees "speculative" G&G data acquisition and permitting activities pursuant to 30 CFR Parts 551 and 580. Specifically, 30 CFR Part 551 regulates prelease G&G exploratory operations for oil, gas, and sulfur resources, and 30 CFR Part 580 regulates prelease prospecting activities. BOEM's Office of Leasing and Plans oversees "on-lease" or "ancillary" G&G data acquisition pursuant to 30 CFR Part 550, which applies to post-lease G&G exploratory operations.

The G&G surveys provide information used by industry and government to evaluate the potential for offshore oil and gas resources, renewable energy development, mineral resources exploration and development, and geologic hazards in a particular area. Industry needs accurate data to determine the location, extent, and properties of hydrocarbon resources. Information on shallow geologic hazards and seafloor geotechnical properties assists in the safe and economical exploration, development, production, and transportation of hydrocarbons. Additionally, the results of G&G surveys characterize sea bottom conditions before installing a renewable energy facility or to verify the completion of decommissioning activities.

The scope of the effects on resources from activities proposed in Fugro's G&G survey permit application, L25-017, were fully discussed and analyzed in the GOM G&G PEIS. Neither the specific location, equipment, nor the duration of this proposal will result in impacts different from those discussed in the relevant NEPA compliance documents. Existing peer-reviewed literature and environmental monitoring suggests the proposed activity will not result in a different cumulative impact conclusion from what was made in the relevant NEPA compliance documents. This information was not available or considered during the preparation of the GOM G&G PEIS. Therefore, this SEA was prepared by BOEM to evaluate the operator's proposed G&G activities in light of any new changes in the baseline and/or new information.

1.2. Purpose of and Need for the Proposed Action

Fugro has submitted a permit application, L25-017, to conduct a G&G activity on the OCS. The permit application proposes to conduct integration testing of a high-resolution 3D seismic acquisition system using airguns and ocean bottom nodes (OBNs). This information can be utilized to evaluate the potential for, and develop plans for, the development and production of hydrocarbons or mineral resources on the OCS, which would help satisfy the Nation's need for energy or coastal restoration resources. Additional information regarding other survey activities can be found in the GOM G&G PEIS.

The need for this action is established by BOEM's responsibility under the Outer Continental Shelf Lands Act (OCSLA) to make OCS lands available for expeditious and orderly development, subject to environmental safeguards, in a manner that is consistent with the maintenance of competition and other national needs. Section 11 of the OCSLA at 43 United States Code (U.S.C.) 1340 requires anyone seeking to conduct such activities to first obtain approval from BOEM. The Secretary of the Interior oversees the OCS oil and gas program, and BOEM and BSEE are the agencies charged with this oversight and regulated management of the permitted or otherwise authorized oil and gas activities. The Secretary is required to balance orderly resource development with protection of the human, marine, and coastal environments while ensuring that the U.S. public receives a fair return for resources discovered on and produced from public lands (43 U.S.C. 1332[3]).

In response to the proposed activities in Fugro's application, BOEM has regulatory responsibility, consistent with the OCSLA and other applicable laws, to approve, approve with modifications or conditions of approval, or deny the application. BOEM's regulations provide criteria that BOEM will apply in reaching a decision and providing for any applicable conditions of approval.

1.3. Description of the Proposed Action

Fugro proposes to conduct integration testing of a high-resolution 3D seismic acquisition system utilizing airgun arrays and OBNs. The OBNs will be placed on the seafloor and recovered using a remote operational vehicle (ROV). The vessel *Holiday Chouest* will be utilized for the integration testing. The proposed activities are located south of Louisiana in the Central Planning Area. The proposed testing area will be within OCS block West Delta 124.

The area of the proposed action is approximately 16 miles (26 kilometers) from the nearest shoreline and in water depths ranging from approximately 295 feet (ft) (90 meters [m]). Site-specific analysis was completed using Fugro's description of the proposed operations; however, specific technical information regarding the G&G activities described in the permit application is proprietary and therefore is not included in this document. The proposed survey is expected to take approximately 8 days to complete and will begin in August 2025. (Fugro, 2025).

3D Seismic Survey Using Ocean Bottom Nodes and Pressure Inverted Echosounders

Seismic surveys OBNs as receivers involve the placement of OBNs on the seafloor. The OBNs are typically placed using a ROV from a node handling vessel. After deployment, a source vessel towing an airgun array passes along the receivers. The OBNs may remain deployed for a couple of days to several weeks, depending on the survey's design. After a survey is completed, the sensors are retrieved by an ROV. Each node placement would temporarily affect a small area of the seafloor.

PIES are used for measuring the average speed of sound in the water column. PIES use an up chirp to accurately measure two-way travel-time in the water column. It simultaneously measures pressure at the seafloor. Pressure measurements are converted to depth to find the acoustic distance traveled from the seafloor to the surface and back again. By combining the depth and travel time, the average speed of sound in the water column is calculated (Sonardyne, 2022).

The sound source typically used in most seismic surveys is an airgun array. An airgun array consists of pneumatic devices that produce acoustic output through the rapid release of a volume of compressed air. The airgun array is designed to direct the high energy bursts of low-frequency sound (termed a "shot") downward toward the seafloor. Reflected sounds from below the seafloor are received by an array of sensitive hydrophones on cables (collectively termed "streamers") that are either towed behind a survey vessel, attached to cables/nodes placed on or anchored to the seafloor, or placed within the wellbore during vertical seismic profile surveys. A typical full-scale array produces a source level of 248 to 255 dB re 1 µPa-m (decibels referenced to 1 microPascal at a distance of 1 meter), zero-to-peak (referring to the waveform of the sound pulse). Typical seismic arrays being used in the Gulf produce source levels (sound pressure levels) of approximately 240 dB re 1 µPa-m. While the seismic array pulses are directed toward the ocean bottom, sound can propagate horizontally for several kilometers (Richardson et al., 1995). Measurements of sources at sea (Goold and Fish, 1998; Sodal, 1999) have demonstrated that, although airgun arrays are primarily a source of low-frequency energy, there is also some transmission of energy at higher frequencies. These energies encompass the entire audio frequency range of 20 hertz (Hz) to 20 kilohertz (kHz) (Goold and Fish, 1998) and may extend well into the ultrasonic range up to 50 kHz (Sodal, 1999).

2. ALTERNATIVES CONSIDERED

2.1. NO ACTION ALTERNATIVE

Alternative 1 –If this alternative is selected the applicant would not undertake the proposed activity. This alternative might prevent the exploration and development of hydrocarbons or mineral resources, resulting in the potential loss of royalty income and energy resources for the United States.

2.2. PROPOSED ACTION AS SUBMITTED

Alternative 2 – If this alternative is selected the applicant would undertake the proposed activity as requested in the application. No COAs would be required by BOEM.

2.3. PROPOSED ACTION WITH CONDITIONS OF APPROVAL

Alternative 3 – This is BOEM's *Preferred Alternative*. If this alternative is selected the applicant would undertake the proposed activity as requested in the application, but with the COAs identified by BOEM and in accordance with the 2025 NMFS BiOp and 2024 NMFS Incidental Take Regulation (listed in **Chapter 2.4** below and described in the effects analyses), to fully address the site- and project-specific impacts of the proposed action.

2.4. SUMMARY AND COMPARISON OF THE ALTERNATIVES

If selected, Alternative 1, the No Action Alternative, would prevent the applicant from acquiring the proper permits and the subsequent collection of seismic data on the OCS. The information would not be available to industry and government to assist in their evaluation of offshore oil and gas resources, geologic hazards, or potential renewable energy sites in a particular area. Alternative 1 would not result in any impacts to the environmental resources analyzed in **Chapter 3**; however, it does not meet the underlying purpose and need.

If selected, Alternative 2 would allow for the collection of seismic data, as requested in the application, but would not include any additional COAs or monitoring measures applied by BOEM or NMFS. Alternative 2 meets the underlying purpose and need of the proposed action but could cause unacceptable impacts to the environmental resources analyzed, as described in **Chapter 3** (e.g., hearing loss in marine mammals, injuries to marine mammals and sea turtles from vessel

strikes, potential damages to unknown cultural resources and benthic resources on the seafloor). Alternative 2 would not require the implementation of COAs and monitoring measures developed by BOEM, in coordination with NMFS, to limit the potential for lethal and sublethal impacts to marine mammals and sea turtles.

Alternative 3 is the Preferred Alternative, based on the analysis of potential impacts to resources described in **Chapter 3** because it meets the underlying purpose and need, and also implements COAs and monitoring measures that adequately limit or negate potential impacts. Implementation of these standard mitigation and monitoring measures was assumed as part of the analysis in the 2025 BiOp, and BOEM is committed to requiring their implementation. The COAs and monitoring measures were identified and will need to be imposed to provide further protection for marine mammals per the 2024 NMFS Incidental Take Regulation (NMFS, 2024a) (see **Chapter 3.2**). The G&G activities proposed will provide Fugro with sufficient data to determine the effectiveness of the high-resolution 3D seismic acquisition system being tested. Additionally, the collected data supports BOEM's regulatory and oversight responsibilities while promoting the refinement of data acquisition systems for identifying hydrocarbon resources, potentially resulting in increased royalty income as well as energy or mineral resources for the United States.

Other alternatives regarding Agency oversight of the G&G permitting program, identified in Chapter 2 of the GOM G&G PEIS, were reviewed with the alternatives listed above chosen as reasonable for the current proposed action.

Conditions of Approval Required under the Preferred Alternative

The need for and utility of the following conditions of approval and monitoring measures are discussed in the relevant impact analysis sections of this SEA. The following conditions of approval and reporting requirements were identified to ensure adequate environmental protection and post-activity compliance:

- **COMPLIANCE WITH BIOLOGICAL OPINION TERMS AND CONDITIONS AND REASONABLE AND PRUDENT MEASURES:** This approval is conditioned upon compliance with the Reasonable and Prudent Measures and implementing Terms and Conditions of the Biological Opinion (BiOp) issued by the National Marine Fisheries Service (NMFS) on May 20, 2025 (2025 NMFS BiOp). This compliance includes mitigation, particularly any Terms and Conditions applicable to the plan, as well as record-keeping and reporting sufficient to allow BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) to comply with reporting and monitoring requirements under the BiOp, and any additional reporting required by BOEM or BSEE developed as a result of BiOp implementation. The 2025 NMFS BiOp may be found here: https://www.fisheries.noaa.gov/resource/document/biological-and-conference-opinion-bureau-ocean-energy-management-and-bureau. The BiOp Attachments and Appendices may be found here: https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.

- **OPERATIONAL NATIONAL MITIGATION PROTOCOLS FOR GEOPHYSICAL SURVEYS:** The applicant will follow the protocols provided under Attachment 1: Operational National Mitigation Protocols for Geophysical Surveys found in the 2025 NMFS BiOp. The protocols can be accessed on the National Oceanic and Atmospheric Administration (NOAA) Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.

- **MARINE DEBRIS PROTOCOL:** The applicant will follow the protocols provided under Attachment 2: Marine Debris Protocol found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.

- **VESSEL-STRIKE AVOIDANCE AND INJURED AND/OR DEAD AQUATIC PROTECTED SPECIES REPORTING PROTOCOLS:** The applicant will follow the protocols provided under Attachment 3: Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries

internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.

- **VESSEL TRANSIT WITHIN THE RICE'S WHALE AREA AS IDENTIFIED IN THE 2020 BIOLOGICAL OPINION'S REASONABLE AND PRUDENT ALTERNATIVE:** The applicant will follow the protocols provided under Attachment 4: Vessel Transit within the Rice's Whale Area as identified in the 2020 BiOp Reasonable and Prudent Alternative (2020 RWA) found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.

- **IN-WATER LINE PRECAUTION PROTOCOL:** The applicant will follow the protocols provided under Attachment 5: In-water Line Precaution Protocol found in the 2025 NMFS BiOp. The protocols can be accessed on NOAA Fisheries internet website at https://www.fisheries.noaa.gov/resource/document/attachments-and-appendices-2025-gulf-america-oil-and-gas-biological-opinion.

- **NON-RECURRING MITIGATION FOR THE PROTECTION OF POTENTIAL ARCHAEOLOGICAL RESOURCES:** This review indicates that there may be significant archaeological sites existing within the area of proposed ROV, 3D seismic, and OBN operations within the Federal waters of the OCS. Significant portions of the project area within the OCS have received either limited or no previous archaeological survey. These areas could contain additional archaeological materials that may be impacted by the proposed operations. All ROV operations must avoid impacting archaeological resources with the tether. One option is to use an ROV Tether Management System (TMS) to minimize entanglement risk and mitigate unnecessary seafloor contact. A second option would be to manually reduce slack in the tether during dive operations. Other options can be used if they are sufficient to actively avoid impacting archaeological sites, but they will need prior review and approval with BOEM archaeology. If you choose to develop your own tether management solution, email archaeology@boem.gov noting your application number in the subject line of the email.

  If the applicant discovers human-made debris that appears to indicate the presence of a shipwreck (e.g., a sonar image or visual confirmation of an iron, steel, or wooden hull, wooden timbers, anchors, concentrations of human-made objects, such as bottles or ceramics, piles of ballast rock, aircraft wreckage or remains) within or adjacent to the area during the proposed survey operations, the applicant will be required to immediately halt operations, take steps to ensure that the site is not disturbed in any way, and contact the BOEM Regional Supervisor of the Office of Environment within 48-hours of its discovery. The applicant must cease all operations within 1,000 feet (305 meters) of the site until the Regional Director instructs them on what steps must be taken to assess the site's potential historic significance and what steps must be taken to protect it. If an ROV impacts any submerged object, the applicant must also submit a report detailing each instance of this activity. This report should include the coordinates of the impact (to DGPS accuracy), a description of the submerged object, any damage that may have resulted from the OBN placement or retrieval operations, and any photographic and/or video imagery that is collected. The applicant must also submit a copy of any data collected as a result of these investigations.

  If remote-sensing survey data is collected for any reason during the course of this project (i.e., side-scan sonar, sector-scan sonar, multi-beam bathymetry, or magnetometer), the applicant must submit copies of these data to BOEM.

  Please direct any questions or correspondence pertaining to these requirements to Ms. Melanie Damour at (504) 736-2783 or by emailing archaeology@boem.gov.

- **NON-RECURRING MITIGATION BENTHIC COMMUNITIES:** BOEM review of geophysical activities proposed in L25-017 identified the potential for sensitive sessile benthic resources within the proposed node area. According to NTL 2009-G39, the minimum separation distance for bottom disturbing activities is 30 m (100 ft) from any sensitive sessile benthic community.

Based on the methods described in the application, BOEM authorizes the applicant to deploy nodes with less than 30 m (100 ft) avoidance of benthic communities contingent upon the applicant adhering to the mitigations described below:

1. All seafloor disturbances, including nodes, cables, and ROV, must remain a minimum of 5 m (16 ft) from all sensitive sessile benthic communities.
2. The operator must photograph the seabed within a 10 m (33 ft) radius of any node placed within 30 m (100 ft) of sensitive sessile benthic communities. Photographs of each such location shall be taken pre-node deployment, post-node deployment, and post-node retrieval. The photos shall clearly show the geographic location of each node.
3. If any sessile benthic communities are present at a proposed node location, a new site that allows compliance with the above requirements shall be selected.
4. The operator must provide an as-placed GIS shapefile of actual OBN locations to demonstrate compliance. Submit the required photographs and shapefile to the BOEM Regional Supervisor, Office of Resource Evaluation, Data Acquisition and Special Projects Unit, within 90 calendar days after completing the G&G activity.

If you have any question regarding this mitigation, please contact Dr. Alicia Caporaso – Benthic Ecology Lead (Alicia.Caporaso@BOEM.gov).

2.5. ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

A viable alternative is required to be a logical option for carrying out the proposed action, ensure that the purpose of and need can be met, and be feasible under the regulatory directives of the OCSLA and all other applicable guidance. As such, other alternatives regarding Agency oversight of the G&G permitting program, identified in the GOM G&G PEIS, were reviewed with the alternatives listed above chosen as reasonable for the current proposed action. Several other alternatives were considered and reviewed during the coordination of the resource reviews, but they were ultimately dismissed and not analyzed further since they did not meet the aforementioned requirements. The following alternative was considered and given review; however, it was not accepted for the reasons discussed below.

Alternative Requiring Shut-Down Conditions for Delphinids

This analysis also considered whether to apply the shutdown conditions to delphinids. From a biological standpoint, the best available information suggests that delphinids are considered mid-frequency specialists (i.e., auditory bandwidth of 150 Hz to 160 kHz) (Southall et al., 2007). Low frequency seismic arrays, such as the one considered for use under this proposed action, generally operate in the frequency range of 20 Hz to 20 kHz (Goold and Fish, 1998) and may extend well into the ultrasonic range up to 50 kHz (Sodal, 1999). Therefore, while the majority of the seismic noise occurs at frequencies below that of delphinids, there are some components that may enter into the hearing range of delphinids (Goold and Fish, 1998). These higher frequency components would be at lower intensity levels (i.e., not as loud). It is unclear, though, from a scientific standpoint whether any of the seismic noise that might be heard by delphinids is in fact disruptive.

Delphinids are known to bow ride on operating seismic vessels. BOEM funded a data synthesis study on the effectiveness of seismic survey mitigation measures and marine mammal observer reports (BOEM, 2012) that analyzed protected species observer (PSO) data collected from 2002-2008 in the Gulf. Approximately 58 percent of all dolphin sightings occurred within the 500-m exclusion zone, and of these, 33 percent were exhibiting bow-riding behavior.

Looking at these records for a typical year (2009), approximately 400 (~27%) were delphinids within the 500-m exclusion zone with operating airguns. In that same year, there were 55 records of shutdowns for whales within the 500-m exclusion zone. If sources had also been shut down for the 400 sightings of delphinids, this would have resulted in a 7-fold increase in the number of shutdowns. There is little doubt then that a shutdown provision for delphinids within the exclusion zone would have a significant impact on seismic operations, such as those under the proposed action.

BOEM next considered whether a provision could be applied to allow for a reasonable exception for bow riding delphinids. For example, a provision could be considered that would allow PSOs to call for a power down (versus immediate shutdown) of the seismic source to the smallest airgun should any delphinid enter, or come close to entering, the 500-m exclusion zone referenced under the 2025 NMFS BiOp or 2024 NMFS Incidental Take Regulation. If the delphinids leave the exclusion zone or engage in bow riding behavior then the PSO could call for the immediate return of the array to full power. This would allow for an opportunity for the PSO to determine if the behavior of the animal(s) warranted a shut down and if not would allow the applicant to return to full power more quickly (versus a shutdown followed by a 30-minute clearance of the zone and a 20-to-40-minute ramp up procedure).

Based on the PSO sighting records, it is clear that shutdowns for delphinids would result in an impact to industry activities. Unlike other sound producing activities (e.g., sonar), seismic surveys occur on specified tracklines that need to be followed in order to meet the data quality objectives of the survey. In other words, seismic vessels in operation cannot simply divert away from nearby marine mammals without a loss in data quality. As stated above, an analysis of 2009 PSO data (BOEM, 2012) indicates that if shutdowns for delphinids within the exclusion zone were employed there would have been a 7-fold increase in shutdowns of seismic arrays that year. Shutdowns of 30 minutes or longer would have required an additional 30-minute observation period to ensure animals have left the exclusion area followed by a 20-to-40-minute ramp up procedure. In all likelihood, these shutdowns would then have required the applicants to return to an earlier point in the track line and resurvey the area again. This not only results in substantially more expense in down time and repositioning of seismic arrays and streamers but would also likely increase the duration of and amount of total seismic noise for each affected survey area.

Conclusion

Based on the analysis above, BOEM believes it is essential to more fully investigate and vet the application of shut down conditions to delphinids before requiring it as a COA (under Alternative 3) or considering it as an additional alternative to the proposed action. It is BOEM's intention, therefore, to fully analyze the application of this COA.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

3.1. INTRODUCTION

The discussion below will: (1) describe/summarize the pertinent potentially affected resources; (2) determine whether the proposed G&G activities and their impact-producing factors (IPF) will have significant impacts on the marine, coastal, or human environments; and (3) identify significant impacts, if any, that may require further NEPA analysis in an EIS. The description of the affected environment and impact analysis are presented together in this section for each resource.

For each potentially affected resource, BOEM staff reviewed and analyzed all currently available peer-reviewed literature and integrated these data and findings into the analyses below. The analyses cite the best available, relevant scientific literature. BOEM performed this analysis to determine whether Fugro's proposed survey activities will significantly impact the marine, coastal, or human environments. For the impact analysis, resource-specific significance criteria were developed for each category of the affected environment. The criteria for impacts to environmental resources are generally classified into one of the three following levels:

- ***Significant Adverse Impact*** (including those that could be mitigated to nonsignificance)
- ***Adverse but Not Significant Impact***
- ***Negligible Impact***.

Preliminary screening for this assessment was based on a review of previous SEAs, relevant NEPA compliance documents, and relevant literature pertinent to historic and projected activities. BOEM initially considered the following resources for impact analysis:

- marine mammals, including Endangered Species Act (ESA) listed species and strategic stocks
- sea turtles (all are ESA listed species)
- fishes, including listed species and ichthyoplankton
- commercial and recreational fisheries
- coastal and marine birds, including ESA listed species
- benthic communities
- archaeological resources
- military uses
- recreational and commercial diving
- marine transportation
- geology/sediments
- air and water quality.

In the GOM G&G PEIS, the impact analysis focused on a broad group of G&G activities (including other survey types) and resources with the potential for non-negligible impacts. First, a matrix identifies impact agents associated with each type of G&G activity. The IPFs include: (1) active acoustic sound sources, (2) vessel and equipment noise, (3) vessel traffic, (4) aircraft traffic and noise, (5) stand-off distance, (6) vessel discharges, (7) trash and debris, (8) seafloor disturbance, (9) drilling discharges, (10) entanglement, and (11) accidental fuel spills. The preliminary analysis in the GOM G&G PEIS considers surveys of the type proposed by Fugro as well as impacts to resources by type of activity. To assist with subsequent coordination, the GOM G&G PEIS' analysis further defines the level of impact associated with each interaction as follows:

- **Nominal:** little or no measurable/detectable impact
- **Minor**: impacts are detectable, short term, extensive or localized, but less than severe
- **Moderate**: impacts are detectable, short term, extensive, and severe; or 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.

The GOM G&G PEIS notes that G&G surveys have historically covered a large area of the region each year and, when unmitigated, have the greatest potential for "significant" impacts to protected and other sensitive marine species in comparison with other OCSLA-approved activities, including, but not limited to, exploration and development drilling. Further, it acknowledges increasing concerns in the regulatory and scientific communities regarding acoustic impacts on marine life, including marine mammals, turtles, and fishes. Species of particular concern are those whose hearing capabilities (based on vocalization characteristics) fall within the low frequencies introduced into the marine environment by G&G activities. The GOM G&G PEIS provides a comprehensive characterization of biological resources that may be adversely affected by G&G activities. This information is summarized in the various resource-specific descriptions of the affected environment and impact analyses in the chapters that follow.

However, for the purposes of this SEA, BOEM has not included analyses on resource areas that were evaluated and considered under the GOM G&G PEIS as having nominal impacts or determined the resource would not be impacted by the proposed action. Such a procedure is consistent with the NEPA concept of tiering. Additionally, since no expansion or modification of support bases or related vessel construction work are proposed as a result of this activity, socioeconomic effects were not analyzed due to the type, the temporary nature, and employment size of the survey activity. The most recent evaluation of the best available peer-reviewed scientific literature continues to support this conclusion for the following resource categories:

- commercial and recreational fisheries
- coastal and marine birds, including ESA listed species

- recreational and commercial diving
- marine transportation
- geology/sediments
- air and water quality

For this SEA, BOEM evaluated the potential impacts from the applicant's proposed G&G activities on the following resource categories:

- marine mammals, including threatened/endangered and non-ESA listed species
- sea turtles (all are ESA listed species)
- fish and fisheries, including listed species and ichthyoplankton
- benthic communities
- archaeological resources

3.2. MARINE MAMMALS

3.2.1. Description

The marine mammal community is diverse and distributed throughout the northern Gulf waters. The marine mammals are represented by members of the taxonomic order Cetacea, including suborders Mysticeti (i.e., baleen whales) and Odontoceti (i.e., toothed whales), as well as the order Sirenia (i.e., manatee). Twenty-one species of cetaceans and one species of Sirenia regularly occur in the region and are identified in the NMFS Gulf of Mexico Stock Assessment Reports (Hayes et al., 2024). A complete description of marine mammals can be found in the relevant NEPA compliance documents and is incorporated by reference.

Threatened or Endangered Marine Mammal Species

Only two cetaceans, the sperm whale (*Physeter macrocephalus*) and the Rice's whale (*Balaenoptera ricei*) (previously named the Gulf of Mexico (GOM) Bryde's whale [*Balaenoptera edeni*]), regularly occur in the region and are listed as endangered under the ESA. The Florida manatee (*Trichechus manatus latirostris*), a subspecies of the West Indian manatee (*Trichechus manatus*), has been documented all along the Gulf in nearshore waters, typically less than 4 m (13 ft) deep and within 1,000 m (328 ft) of the shore (Slone et al., 2022). West Indian manatees are currently listed as threatened. However, the Florida manatee subspecies is proposed to be listed as threatened, and the Antillean manatee (*Trichechus manatus manatus*) subspecies as endangered, which would replace the listing of the West Indian manatee (FWS, 2025). The sperm whale was listed as endangered throughout its range on December 2, 1970. The GOM Bryde's (now Rice's) whale was listed as endangered on May 15, 2019. The Rice's whale critical habitat is currently proposed by NMFS in the northern Gulf from the 100 to 400 m (328 to 1,312 ft) isobath (NMFS, 2023c).

The only commonly occurring baleen whale in the northern GOA is the Rice's whale. The majority of Rice's whale detections are limited to the northeastern Gulf along the continental shelf between roughly 100 and 400 m depths (Garrison et al., 2024; NOAA Fisheries, 2025), though there have been some detections outside of this area in the northwestern and northcentral Gulf (Soldevilla et al., 2022; Rappucci et al., 2023; Soldevilla et al., 2024; NOAA Fisheries, 2024). Predicted densities and occurrence of Rice's whales remain highest in their northeastern Gulf habitat (Farmer et al., 2022; Garrison et al., 2024). Sperm whales in the Gulf are not evenly distributed, showing greater densities in areas associated with oceanic features that provide the best foraging opportunities (Garrison et al., 2018).

Non-ESA-Listed Marine Mammal Species

Nineteen toothed cetaceans (including beaked whales and dolphins) regularly occur in the region but are not ESA-listed. Despite being non-listed, the Marine Mammal Protection Act (MMPA) of 1972 protects all marine mammals.

Unusual Mortality Events (UME)

An UME is defined under the MMPA as a "stranding that is unexpected, involves a significant die-off of any marine mammal population, and demands immediate response." A list of active and closed UMEs with updated information can be found at t: https://www.fisheries.noaa.gov/national/marine-life-distress/active-and-closed-unusual-mortality-events. There are currently no active UMEs in the GOA.

Marine Mammal Hearing

Marine mammals are highly dependent on acoustic cues as a primary means of communicating and assessing their environment. For example, toothed whales use echolocation clicks to navigate their surroundings and locate prey, demonstrating the sophisticated use of sound in their ecological interactions (Madsen and Surlykke, 2013). An animal's auditory sensitivity to a sound depends on the spectral, temporal, and amplitude characteristics of the sound (Richardson et al., 1995). Baleen whales (i.e., Rice's whales) are classified within the low-frequency cetacean (LFC) hearing group (7 Hz to 36 kHz); dolphins, beaked whales, and toothed whales (e.g., sperm whales) are classified within the high-frequency cetacean (HFC) hearing group (150 Hz to 160 kHz); and *Kogia* (e.g., dwarf sperm whale and pygmy sperm whale) are classified within the very high-frequency (VHF) cetacean hearing group (200 Hz to 165 kHz) (NMFS, 2024b).

3.2.2. Impact Analysis

The IPFs associated with the proposed action that could affect marine mammals are primarily active acoustic sound sources and vessel noise from survey activities, collisions with survey vessels, and marine trash and debris. The GOM G&G PEIS contains a discussion of the potential impacts from survey operations on marine mammal resources. Additional information about routine impacts from oil and gas activity on impacts on marine mammals is addressed in the relevant NEPA compliance documents. The discussions are summarized below and are incorporated by reference into this SEA.

3.2.2.1. Alternative 1

If Alternative 1, the No Action Alternative, is selected the applicant would not undertake the proposed activities; therefore, the IPFs to marine mammals would not occur. For example, there would be no vessel noise or seismic airgun noise that would result in behavioral change, masking, or non-auditory effects to marine mammals, no long-term or permanent displacement of the animals from preferred habitats, and no destruction or adverse modification of any habitats. In addition, there would be no survey related debris that could result in endangerment to marine mammals and no additional vessel traffic related to the survey activities, so there would be no risk of collisions with marine mammals.

3.2.2.2. Alternative 2

If Alternative 2, the Proposed Action as Submitted, is selected the applicant would undertake the proposed activities as requested and conditioned in the application. Examples of potential impacts to marine mammals without implementation of the COAs and monitoring measures include, but are not limited to, injury from vessel strikes, hearing loss from seismic noise, disruption of feeding and other behaviors from seismic noise and vessel presence, and potential impacts from marine trash and debris. This Alternative would not adequately limit or negate potential impacts to marine mammals.

3.2.2.3. Alternative 3

If Alternative 3, the Proposed Action with COAs, is selected the applicant would undertake the proposed activities as requested and conditioned in the application; however, the applicant would be required to undertake COAs and monitoring measures as identified by BOEM and in accordance with the 2025 NMFS BiOp consultation requirements and 2024 NMFS Incidental Take Regulation. For the reasons set forth below, inclusion of these measures under Alternative 3 limits or minimizes potential impacts to marine mammals.

Potential Impacts to Marine Mammals from Active Acoustic Sound Sources

In 2018, BOEM and NMFS began collaborating to improve efficiency and consistency in joint ESA Section 7 consultations, MMPA authorizations, and BOEM permits related to the oil and gas program and other program areas. The effort was designed to specifically address actions for which the two agencies have regulatory authority, and those that would have the greatest long-term impact to increase efficiency, resolve regulatory issues, and complete actions. From this effort, a peer-reviewed technical paper analyzing active acoustic sources and ascribing them to tiers based on potential level of impact to marine mammals was developed and published (Ruppel et al., 2022). An encyclopedic-like resource describing the sound sources and how they are typically used by different industries was also published (BOEM, 2023b). Jointly developed standard operational protocols which already incorporated tiers for mitigating and monitoring the effects of geophysical surveys, including those from seismic airguns and HRG equipment, are found in the 2025 NMFS BiOp Operational National Mitigation Protocols for Geophysical Surveys, with *de minimis* (i.e., unlikely to result in incidental take) activity characterized (Tier 4).

The potential for noise impacts from anthropogenic sound sources on marine mammals is highly variable and depends on the specific circumstances of a given situation (Richardson et al., 1995; Nowacek et al., 2007; Southall et al., 2007; 2019; 2021). The potential effects of underwater sound from an active acoustic source could result in auditory injury, permanent threshold shift (PTS, i.e., permanent hearing loss), temporary threshold shift (TTS, i.e., reversible hearing loss), behavioral disturbance, stress, masking, and nonauditory physical or physiological effects (Richardson et al. 1995; Nowacek et al. 2007; Southall et al. 2007). The degree of the potential impact depends on the species' hearing frequency, sound characteristics, received level, distance of the animal from the sound source, and duration of the sound exposure.

Because most of the energy from airguns is radiated at frequencies below 200 Hz, low-frequency cetaceans (e.g., Rice's whales) would most likely hear the acoustic source since it falls within their hearing range. High-frequency cetaceans (e.g., sperm whales and beaked whales) have auditory bandwidths that partially overlap with the frequencies of maximum airgun output. Further, because mysticetes (e.g., Rice's whales) produce calls that span a low-frequency range (20 Hz to 30 kHz) with their best hearing abilities presumably falling into this range as well, they would be most likely to experience impacts from the low-frequency sounds produced by seismic surveys (Richardson et al., 1995). In contrast, odontocetes (toothed whales) produce calls and hear best at mid to high frequencies (Richardson et al., 1995) and appear less vulnerable to low-frequency sound sources than mysticetes. There is evidence that some whales' closest points of approach to airgun arrays during seismic operations are substantially farther during full- power operations than during silence, indicating that there may be some avoidance response to the full-power operations (Barkaszi and Kelly, 2019).

BOEM applies the 2025 NMFS BiOp Operational National Mitigation Protocols for Geophysical Surveys to mitigate effects of noises less than 180 kHz and requires PSOs. Under this protocol, airguns are categorized as Tier 1 or 2, depending on total volume. Sources having transmission frequencies higher than 180 kHz are deemed inaudible by marine mammals and therefore their effects are considered *de minimis* (Ruppel et al., 2022). With the application of protocols requiring vessels to maintain distances from marine mammals if within a specific Tier (when applicable) or shutdown of airgun source, the potential for impacts to marine mammals from G&G surveys is reduced or eliminated. The primary impacts expected are behavioral and short-term due to the transient nature of the sound source, and the wide-ranging distributions and movements of marine mammals in the Gulf.

By selecting Alternative 3, the operator is required to follow the COAs and monitoring measures in the 2025 NMFS BiOp and 2024 NMFS Incidental Take Regulation. With these COAs and monitoring measures in place, the impacts to marine mammals are determined to be **minor**.

Potential Impacts to Marine Mammals from Vessel Noise

Vessel noise from the proposed action will produce low levels of noise, generally in the 150 to 170 dB re 1 µPa-m at frequencies below 1,000 Hz. Vessel and equipment noises are transitory

and generally do not propagate at great distances from the vessel. The intensity of noise from service vessels is roughly related to ship size and speed (Erbe et al., 2019). For a given vessel, relative noise tends to increase with increasing speed. Seismic operations with towed gear generally are conducted at relatively slow speeds of 4 to 6 knots, with a maximum speed of less than 8 knots. A comprehensive review of the literature on marine mammals and vessel noise (Erbe et al., 2019; Richardson et al., 1995) revealed that changes in behavior vary widely across species and are heavily dependent on context. Vessel noise could interfere with marine mammal communication either by masking important sounds from conspecifics (a member of the same species), masking sounds from predators, or it may trigger animals to alter their vocalizations (Tyack, 2008). There is the possibility of short-term disruption of movement patterns and/or behavior caused by vessel noise and disturbance. The behavioral disruptions potentially caused by noise and the presence of vessel traffic will therefore have **nominal** effects on cetacean populations in the northern Gulf.

Potential Impacts to Marine Mammals from Vessel Traffic

All marine mammals are vulnerable to accidental vessel strike. However, some marine mammal species may be more vulnerable than others to possible vessel strike with all vessels operating at speed, including primarily slow-moving species (e.g., manatees) or those that spend extended periods of time at the surface (e.g., Rice's whales), and deep-diving species (e.g., sperm whales) while on the surface (Vanderlaan and Taggart, 2007). For example, Rice's whales may spend up to 88 percent of their time at night, and 70 percent of their time overall, within 15 m (39 ft) of the ocean surface (Soldevilla et al., 2017), making them vulnerable to collisions with large vessels (Stevens et al., 2024).

Accidental vessel strike on a marine mammal can result in injury, mortality, or no apparent injury (Laist et al., 2001; Van Waerebeek et al., 2007; Vanderlaan and Taggart, 2007; Pace, 2011). Three fundamental components are essential to understanding and assessing vessel strike risk to any marine mammal population: 1) distribution, occurrence, and habitat selection of the population; 2) dive and surface behavior of individuals; and 3) vessel characteristics, activity, and mitigation measures (Stevens et al., 2024). Further, several factors affect the risk and severity of vessel strike to marine mammals, including species type, speed, health, and behavior of the animal and the path, speed, size, and number of vessels (Laist et al., 2001; Vanderlaan and Taggart, 2007; Martin et al., 2016). Vessel speed and vessel size are of note when assessing strike risk (Stevens et al., 2024; Garrison et al., 2025). Most global reports of vessels striking marine mammals involve large whales, though strikes with smaller species also occur (Van Waerebeek et al., 2007). Strikes involving large vessels (i.e., over 80 m [262 ft]) traveling at speeds of 10 knots or faster are more likely to result in severe injuries and mortality (Laist et al., 2001; Jensen and Silber, 2004; Vanderlaan and Taggart, 2007; Conn and Silber, 2013). Seismic operations with towed gear generally are conducted at relatively slow speeds of 4 to 6 knots, with a maximum speed of less than 8 knots.

The proposed activities are located outside of the area where the Rice's whale is likely to be present. The operator has not proposed any service vessels or vessel traffic within the Rice's whale area. Under Alternative 3, the operator is required to provide notification and concurrence to fulfill the Rice's Whale reporting requirements to BOEM and BSEE prior to any vessel transit changes, per the 2025 NMFS BiOp protocol Vessel Transit within the Rice's Whale Area as identified in the 2020 RWA.

By selecting Alternative 3, the operator is required to follow the COAs and monitoring measures in the 2025 NMFS BiOp Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols, which would prevent or substantially reduce marine mammal interactions with vessels by requiring separation distances, speed restrictions, and the use of onboard observers for monitoring during certain activities. NMFS also provides all boat operators with whale watching guidelines, which are derived from the MMPA. These guidelines suggest safe navigational practices based on speed and distance limitations when encountering marine mammals. With these COAs and monitoring measures in place and considering the wide range of marine mammals in the Gulf, the impacts to marine mammals are determined to be **minor**.

Potential Impacts to Marine Mammals from Marine Trash and Debris

Marine debris can affect marine mammals through entanglement and/or ingestion (e.g., choking or intestinal blockage). Entanglement in marine debris could lead to injury, infection, reduced mobility, increased susceptibility to predation, decreased feeding ability, fitness consequences, and mortality (e.g., drowning) (Gall and Thompson, 2015). In addition, marine debris ingestion could lead to intestinal blockage, which can impact feeding ability and lead to injury or death (Senko et al., 2020). The discharge of marine debris by the offshore oil and gas industry and supporting activities is subject to several laws and treaties. By selecting Alternative 3, the operator is required to follow the COAs in the 2025 NMFS BiOp Marine Debris Protocol, which is designed to prevent or minimize accidental marine debris. With these conditions of approval in place, the impacts to marine mammals are determined to be **nominal**.

Conclusion

Seismic noise has the potential, individually or cumulatively, to result in impacts to marine mammal species commonly found in the proposed action area. However, BOEM finds that the potential for such effects from the proposed action is unlikely to rise to significant levels for the following reasons:

- Mysticetes, as low-frequency hearing specialists, are the species group most likely to be susceptible to impacts from non-pulse sound (intermittent or continuous) given that their hearing ranges overlap most closely with the noise frequencies produced from G&G survey-related noise (Richardson et al., 1995; Southall et al., 2007 and 2019). However, most mysticeti species that may occur in the Gulf (i.e., North Atlantic right, blue, fin, sei, humpback, and minke) are considered either extralimital, rare, or uncommon within the region (Hayes et al., 2024). The only commonly occurring baleen whale in the northern Gulf is the Rice's whale, which is mostly found in the northeastern Gulf. Given the small geographic scope of the proposed action, as well as the operator proposing no survey activity or service vessels through the Rice's whale area, the presence of these species within the action area is unlikely. The potential for significant impacts is prevented or minimized given the implementation of the Operational National Mitigation Protocols for Geophysical Surveys under Alternative 3.
- Manatees are typically uncommon in the proposed action area, though some deepwater sightings have occurred. As they predominantly inhabit only coastal marine, brackish, and freshwater areas, they are not expected to occur regularly in the area of the proposed action.
- The remaining marine mammal species in the Gulf are considered either HFC hearing specialists (e.g., sperm whales, beaked whales, and dolphins) with hearing ranges that partially overlap with the frequencies of maximum airgun output (Richardson et al., 1995; Southall et al., 2007 and 2019) or very VHF hearing specialists (e.g., *Kogia* spp.). Therefore, the potential for seismic noise produced from this proposed action to cause auditory and non-auditory effects, PTS, TTS, behavioral changes, or masking on these species is further limited.
- BOEM requires several COAs and monitoring requirements under Alternative 3, the 2025 NMFS BiOp, and the 2024 NMFS Incidental Take Regulation. The measures are expected to prevent or minimize duration of exposure to G&G survey-related noise, when implemented in accordance with NMFS Incidental Take Authorizations (ITA) under the MMPA.

Given the scope, timing, and transitory nature of the proposed action and given the COAs and monitoring measures in place, the noise related to the proposed seismic survey is not expected to result in PTS, TTS, behavioral change, masking, or non-auditory effects to marine mammals that would rise to the level of significance. The geographic scope of the proposed action is small in relation to the ranges of marine mammals. The proposed survey activities are not expected to cause long-term or permanent displacement of the animals from preferred habitats, nor will they result in the destruction or adverse modification of any habitats. The operator is required to follow the 2025 NMFS BiOp Operational National Mitigation Protocols for Geophysical Surveys, which will prevent or minimize/negate potential acoustic impacts to marine mammals. Survey activities will involve limited slow-moving vessel traffic related to the towing of the airgun array that carries some risk of collisions; however, animals may avoid the moving vessels, reducing the likelihood

of collision. BOEM has adopted requirements from the 2025 NMFS BiOp to prevent or minimize/negate the chance of vessel strike to marine mammals with the Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols. Also, BOEM has adopted requirements from the 2025 NMFS BiOp to prevent or minimize/negate the chance of marine trash and debris impacts to marine mammals with the Marine Debris Protocol.

3.2.3. Cumulative Impact Analysis

The GOM G&G PEIS, Multisale EIS, 2018 SEIS, and 2023 SEIS address the cumulative impacts on marine mammals as a result of oil and gas leasing, exploration, development and production activities, including G&G activities.

Activities considered under the cumulative scenario which include the oil and gas program and other anthropogenic and natural activities, including the proposed action, may affect protected marine mammals or critical habitat. Marine mammals could be impacted by the degradation of water quality resulting from operational discharges; vessel traffic; noise generated by platforms, drilling rigs, helicopters, vessels, and G&G surveys; explosive structure removals; oil spills; oil-spill-response activities; loss of debris from service vessels and OCS structures; commercial fishing; capture and removal; and pathogens. The cumulative impact on marine mammals is expected to result in a number of chronic and sporadic sublethal effects (i.e., behavioral effects and nonfatal exposure to or intake of OCS-related contaminants or discarded debris) that may stress and/or weaken individuals of a local group or population and predispose them to infection from natural or anthropogenic sources.

Few deaths may occur from chance vessel collisions, ingestion of plastic material, commercial fishing, and pathogens. Deaths as a result of structure removals are not expected to occur due to COAs and monitoring measures that the operator must adhere to during operations. Disturbance (noise from vessel traffic and drilling operations, etc.) and/or exposure to sublethal levels of toxins and anthropogenic contaminants may stress animals, weaken their immune systems, and make them more vulnerable to parasites and diseases that normally would not be fatal. The net result of any disturbance will depend upon the size and percentage of the population likely to be affected, the ecological importance of the disturbed area, the environmental and biological parameters that influence an animal's sensitivity to disturbance and stress, or the accommodation time in response to prolonged disturbance (Geraci and St. Aubin, 1980). Natural phenomena such as tropical storms and hurricanes do occur in the region, though impacts remain difficult to quantify.

Incremental effects from the proposed action on marine mammals are expected to be **nominal** for vessel noise, and marine trash and debris; and **minor** for active acoustic sound sources and vessel collisions, though not rise to the level of significance. This is because of the limited scope, duration, and geographic area of the proposed action, the wide-ranging movements of marine mammals in the Gulf, and the required 2025 NMFS BiOp protocols.

Conclusion

The effects of the proposed action, when viewed in light of the effects associated with other relevant activities, may impact marine mammals. With the implementation of the required COAs and monitoring measures for seismic survey and vessel operations under Alternative 3, as well as the limited scope, timing, and geographic location of the proposed action, and considering the wide range of marine mammals in the Gulf, effects from the proposed survey activities on marine mammals will be **nominal** (vessel noise, marine trash and debris) to **minor** (active acoustic sound sources, vessel traffic). For animals that may be continuing to experience stress/sublethal impacts from natural or anthropogenic stressors, the additional measures should act to further reduce impacts and provide an abundance of precaution.

3.3. SEA TURTLES

3.3.1. Description

The life history, population dynamics, status, distribution, behavior, and habitat use of sea turtles can be found in the relevant NEPA compliance documents and are incorporated by reference into

this SEA. Of the extant species of sea turtles, five are known to inhabit the waters of the region (Pritchard, 1997): the leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), and loggerhead (*Caretta caretta*). These five species are all highly migratory, and individual animals will migrate into nearshore waters as well as other areas of the North Atlantic Ocean, Gulf, and Caribbean Sea. Garrison et al. (2020) found that spatial and seasonal variation in loggerheads in the northern Gulf represents the shift in habitats and behavioral modes across seasons, with animals moving into deeper waters and spending progressively less time at the surface during cooler months. Further, Lamont and Hart (2023) found that time at the surface was greater for loggerhead, Kemp's ridley, and green turtles in summer, though did not differ between BOEM's Eastern Planning Area (EPA) and CPA, except for Kemp's ridleys, which spent more time at the surface in the Western Planning Area (WPA) than the EPA.

All five species of sea turtles found in the Gulf have been federally listed as endangered or threatened since the 1970s. The North Atlantic Distinct Population Segment (DPS) of green turtle is ESA-listed as threatened. Hawksbill turtles, Kemp's ridley turtles, leatherback turtles, and the Northwest Atlantic Ocean DPS of loggerhead turtle are ESA-listed as endangered. Floating *Sargassum* patches are federally designated under the ESA as critical habitat for loggerhead turtles (NMFS, 2014) and proposed for green turtles (NMFS, 2023b).

Sea Turtle Hearing

There is limited data available on sea turtle hearing abilities. While the general importance of sound to sea turtles is not well understood, there is a growing body of knowledge suggesting that sea turtles use sound in a multitude of ways. Sea turtles may use sound for navigation, locating prey or preferred habitat, predator avoidance, and environmental awareness (Piniak et al., 2016). There are few studies reporting sound production in sea turtles, despite their ability to hear sounds in both air and water. In general, sea turtles hear best in water at levels between 100 to 750 Hz, do not hear well above 1 kHz, and are generally less sensitive to sound than marine mammals (Papale et al., 2020; Reese et al., 2023).

3.3.2. Impact Analysis

The diversity of a sea turtle's life history leaves it susceptible to many natural and human impacts, including impacts while it is on land, in the benthic environment, and in the pelagic environment. The IPFs associated with the proposed action that could affect sea turtles include (1) active acoustic sound sources, (2) vessel noise, (3) vessel traffic, and (4) marine trash and debris. The GOM G&G PEIS contains a discussion of the potential impacts from survey operations on sea turtles (BOEM, 2017a). Additional information about routine impacts from oil and gas activity on sea turtles is addressed in the relevant NEPA compliance documents. The discussions are summarized below and are incorporated by reference into this SEA.

3.3.2.1. Alternative 1

If Alternative 1, the No Action Alternative, is selected the applicant would not undertake the proposed activities; therefore, the IPFs to sea turtles would not occur. For example, there would be no vessel noise or seismic airgun noise that would result in behavioral change, masking, or non-auditory effects to sea turtles, no long-term or permanent displacement of the animals from preferred habitats, and no destruction or adverse modification of any habitats. Since there would be no vessel traffic related to the towing of the airgun array, there would be no risk of collisions with sea turtles.

3.3.2.2. Alternative 2

If Alternative 2, the Proposed Action as Submitted, is selected the applicant would undertake the proposed activities, as requested and conditioned in the application. Examples of potential impacts to sea turtles without implementation of the above referenced COAs and monitoring measures include, but are not limited to, potential impacts from marine trash and debris, potential hearing impacts from active acoustic sound sources, injury from vessel traffic, and disruption of

feeding and other behaviors from vessel presence. This Alternative would not adequately limit or negate potential impacts to sea turtles.

3.3.2.3. Alternative 3

If Alternative 3, the Proposed Action with COAs, is selected the applicant would undertake the proposed activities as requested and conditioned in the application; however, the applicant would be required to undertake COAs and monitoring measures as identified by BOEM and in compliance with the 2025 NMFS BiOp consultation requirements. For the reasons set forth below, inclusion of these measures under Alternative 3 limits or negates potential impacts to sea turtles.

Potential Impacts to Sea Turtles from Active Acoustic Sound Sources

Noise associated with G&G activities may result in behavioral effects (e.g., changes in direction or swimming speed) or auditory masking in sea turtles. The most likely impacts on sea turtles are expected to be short-term behavioral responses. Studies have demonstrated avoidance behavior of sea turtles to seismic surveys (O'Hara and Wilcox, 1990; Lenhardt, 1994; McCauley et al., 2000a; Piniak, 2012). Sea turtles may alter their behaviors when a seismic vessel approaches, and thereby suspend feeding, resting, or interacting with conspecifics. Such disruptions are expected to be temporary, however, and are not expected to impact the overall survival and reproduction of individual turtles. Seismic operations have the potential to permanently injure sea turtles in close proximity to active airgun arrays (Popper et al., 2014). Subadult and adult turtles may be more likely to be affected by seismic airgun noise than post-hatchling turtles because of the time that they remain submerged at depth. Post-hatchling turtles generally reside at or near the sea surface and may be less likely to be injured by the sound field produced by an airgun array projecting directionally downward. Sea turtles have been observed to dive immediately following airgun shots, suggesting an avoidance response. Few data are recorded about the potential direct physical injury to turtles from seismic surveys (Nelms et al., 2016).

Airguns are categorized as Tier 1 or 2 (per the 2025 NMFS BiOp Operational National Mitigation Protocols for Geophysical Surveys) depending on total volume. Tier 1 sound sources are high energy surveys that would likely require mitigation and monitoring. Tier 2 sound sources are low to intermediate energy sources. Tier 2 sources are expected to have significantly fewer effects than Tier 1 sources. BOEM applies the 2025 NMFS BiOp Operational National Mitigation Protocols for Geophysical Surveys to mitigate effects of noises less than 180 kHz and requires PSOs. The application of protocols requiring vessels to maintain distances from sea turtles when applicable or mandatory pause of airgun sources would prevent or reduce the potential for impacts. Therefore, potential impacts to sea turtles from seismic surveys are unlikely if sufficiently distanced from the sound source. Given the scope, timing, and transitory nature of the proposed action, the wide-ranging movements of sea turtles in the Gulf, the implementation of Operational National Mitigation Protocols for Geophysical Surveys, and that the best available information indicates that sea turtles do not appear to use environmental sound heavily to meet daily needs for survival, the effects to sea turtles from seismic noise are expected to be **nominal.**

Potential Impacts to Sea Turtles from Vessel Noise

The dominant source of noise from vessels is propeller operation, and the intensity of this noise is largely related to ship size and speed. Seismic operations with towed gear generally are conducted at relatively slow speeds of 4 to 6 knots, with a maximum speed of less than 8 knots. Vessel noise from the proposed action would produce low levels of noise, generally in the 150 to 170 dB re 1 µPa-m at frequencies below 1,000 Hz. Vessel and equipment noises are transitory and generally does not propagate at great distances from the vessel. There is no information regarding the long-term consequences that vessel noise may have on sea turtles. Hazel et al. (2007) demonstrated that sea turtles appear to respond behaviorally only to vessels at approximately 33 ft (10 m) or closer. Noise from service vessel activity may elicit a startle response from sea turtles, and there is the possibility of short-term disruption of activity patterns and temporary sublethal stress (National Research Council, 1990). It is conservative to assume that noise associated with survey vessels may elicit behavioral changes, such as evasive maneuvers, in individual sea turtles. The most likely effects of vessel noise on sea turtles could

include short-term behavioral changes and possibly auditory masking. Based on the best available information, vessel noise is not expected to significantly disrupt normal behavior patterns in sea turtles that include, but are not limited to, breeding, feeding, or sheltering. Further, vessel noises generated by the proposed action will be localized and short term. It is not expected that vessel noise will have any detectable effect on biologically important behaviors of sea turtles. The effects to sea turtles from vessel noise are therefore expected to be **nominal**.

Potential Impacts to Sea Turtles from Vessel Traffic

Sea turtles are vulnerable to vessel strikes due to the time they spend at the ocean surface. Limited data are available concerning potential sea turtle impacts from vessel strikes due to a lack of studies and the challenges with detecting such impacts (Nelms et al., 2016). Nonetheless, strikes from all types of vessels are known to result in sea turtle injury and mortality in the Gulf (Lutcavage et al., 1997; Work et al., 2010; Nelms et al., 2016). If a sea turtle is struck by a vessel, no apparent injury, minor non-lethal injury, serious injury, or mortality can occur with the associated effects varying based on the size and speed of the vessel. Seismic operations with towed gear generally are conducted at relatively slow speeds of 4 to 6 knots, with a maximum speed of less than 8 knots.

To prevent or minimize the potential for vessel strikes, BOEM requires operators to implement the Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols, which contains vessel strike avoidance measures for sea turtles and other protected species. As per the required reporting under the 2025 NMFS BiOp Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols, BOEM requires that any operator immediately report the striking of any animal. To date, there have been no reported strikes of sea turtles by G&G survey vessels; however, collisions with small or submerged sea turtles may go undetected. Given the scope, timing, and transitory nature of the proposed action, the wide-ranging movements of sea turtles in the Gulf, and adherence to the COAs and monitoring measures, effects to sea turtles from vessel collisions are expected to be **minor**.

Potential Impacts to Sea Turtles from Marine Trash and Debris

Marine debris affects sea turtles primarily through entanglement and/or ingestion (e.g., choking or intestinal blockage) (Gall and Thompson, 2015). Entanglement in marine debris could lead to injury, infection, reduced mobility, increased susceptibility to predation, decreased feeding ability, fitness consequences, and/or mortality (e.g., drowning) of sea turtles (Gall and Thompson, 2015). Marine debris ingestion could lead to intestinal blockage, which can impact feeding ability and lead to injury or death (Senko et al., 2020). The discharge of marine debris by the offshore oil and gas industry and supporting activities is subject to several laws and treaties. By selecting Alternative 3, the operator is required to follow the COAs in the 2025 NMFS BiOp Marine Debris Protocol, which is designed to prevent or minimize accidental marine debris. With these COAs in place, the impacts to sea turtles are determined to be **nominal**.

Conclusion

The sections above discuss sea turtle hearing in general and the potential range of effects to sea turtles from the proposed action, including (1) active acoustic sound sources, (2) vessel noise, (3) vessel traffic, and (4) marine trash and debris.

Effects of seismic noise on sea turtles will not rise to the level of significance for the following reasons:

- The best available scientific information indicates that sea turtles do not greatly use sound in the environment for survival; therefore, disruptions in environmental sound would have little effect.
- BOEM instituted several key mitigation and monitoring requirements under the Operational National Mitigation Protocols for Geophysical Surveys. The measures are expected to prevent or minimize duration of exposure to sounds above threshold.

- The scope, timing, and transitory nature of the proposed action will produce limited amounts of seismic noise in the environment.

Effects of vessel noise on sea turtles are considered discountable. The risk of impacts from marine trash and debris would not rise to the level of significance given that BOEM requires compliance with Marine Debris Protocol. The risk of collisions between sea turtles and vessels associated with the proposed action exist but would not rise to the level of significance given:

- BOEM requires compliance with the Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols, which provides guidelines on monitoring programs to prevent or minimize the risk of vessel strikes to sea turtles and other protected species and the reporting of any observations of injured or dead protected species.
- The scope, timing, and transitory nature of the proposed action, and wide-ranging movements of sea turtles in the Gulf, will result in limited opportunity for vessel strikes on sea turtles.

3.3.3. Cumulative Impact Analysis

The GOM G&G PEIS, Multisale EIS, 2018 SEIS, and 2023 SEIS address the cumulative impacts on sea turtles as a result of oil and gas leasing, exploration, development and production activities, including G&G activities. The information from these documents is incorporated by reference in this SEA.

Activities considered under the cumulative scenario which include the oil and gas program and other anthropogenic and natural activities, including the proposed action, may affect protected sea turtles or critical habitat. Sea turtles may be impacted by the degradation of water quality resulting from operational discharges, vessel traffic, noise generated by platforms, drilling rigs, helicopters and vessels, G&G surveys, explosive structure removals, oil spills, oil-spill-response activities, loss of debris from service vessels and OCS structures, commercial fishing, capture and removal, and pathogens. The cumulative impact of these ongoing OCS activities on sea turtles is expected to result in a number of chronic and sporadic sublethal effects (i.e., behavioral effects and nonfatal exposure to or intake of OCS-related contaminants or discarded debris) that may stress and/or weaken individuals of a local group or population and that may predispose them to infection from natural or anthropogenic sources. Through a systematic review, policy comparison, and stakeholder analysis, Nelms et al. (2016) found that potential impacts of seismic surveys on sea turtles vary (i.e., hearing damage, entanglement, and critical habitat exclusion) and can be obscure due to the lack of research. Thus, understanding the impacts on individuals and populations can be challenging, and additional research is needed (Nelms et al., 2016).

Few deaths may occur from chance collisions with vessels, ingestion of plastic material, commercial fishing, and pathogens. No deaths are expected to occur as a result of OCS structure removals due to requisite COAs and monitoring measures. Disturbance (noise from vessel traffic and drilling operations, etc.) and/or exposure to sublethal levels of toxins and anthropogenic contaminants may stress animals, weaken their immune systems, and make them more vulnerable to parasites and diseases that normally would not be fatal. The net result of any disturbance depends upon the size and percentage of the population likely to be affected, the ecological importance of the disturbed area, the environmental and biological parameters that influence an animal's sensitivity to disturbance and stress, or the accommodation time in response to prolonged disturbance (Geraci and St. Aubin, 1980).

Natural disturbances such as hurricanes can cause significant destruction of nests and topography of nesting beaches (Pritchard, 1980; Ross and Barwani, 1982; Witherington, 1986). Tropical storms and hurricanes are a normal occurrence in the Gulf and along the Gulf Coast. Some impacts of the hurricanes, such as loss of beach habitat, continue to impact sea turtles that would have otherwise used those areas as nesting beaches. Increases or decreases in beach armoring and other structures may impact all nesting sea turtles in the areas affected. Hurricanes and tropical activity may temporarily remove some of these barriers to suitable nesting habitat.

Incremental effects from the proposed action on sea turtles are expected to be **nominal** for seismic and vessel noise and marine trash and debris and **minor** for vessel collisions but not rise

to the level of significance. This is mainly because of the limited scope, duration, and geographic area of the proposed action, wide-ranging movements of sea turtles in the Gulf, and the requirements under the 2025 NMFS BiOp.

Conclusion

The effects of the proposed action, when viewed in light of the effects associated with other relevant activities, may affect sea turtles occurring in the region. With the implementation of the required COAs and monitoring measures for seismic survey and vessel operations, wide range of sea turtles in the Gulf, and the scope of the proposed action, incremental effects from the proposed seismic activities on sea turtles will be **nominal** (active acoustic sound sources and vessel noise, marine trash and debris) to **minor** (vessel strikes).

3.4. Fish Resources and Essential Fish Habitat

3.4.1. Description

The life history, population dynamics, status, distribution, behavior, and habitat use of fish and essential fish habitat can be found in the relevant NEPA compliance documents and are incorporated by reference into this SEA.

Threatened or Endangered Species

Three fish species and one elasmobranch species found in the region are protected under the ESA: Gulf sturgeon, smalltooth sawfish, and giant manta ray and the ocean whitetip shark. The Gulf sturgeon (*Acipenser oxyrinchus*) was listed as threatened, effective October 30, 1991, under the ESA in the Federal Register (FR) at 56 FR 49653. The smalltooth sawfish DPS (*Pristis pectinata)* was listed as endangered, effective May 1, 2003, under the ESA at 68 FR 15674. The giant manta ray (*Manta birostris*) was listed as threatened, effective February 21, 2018, under the ESA at 83 FR 2916. The oceanic whitetip shark (*Carcharhinus longimanus*) was listed as threatened, effective March 1, 2018, under the ESA at 83 FR 4153. A detailed description of the Gulf sturgeon and critical habitat, smalltooth sawfish, giant manta ray, and oceanic white tip shark may be found in the 2025 NMFS BiOp.

Gulf sturgeon is predominantly distributed in the nearshore waters of the northeastern Gulf, from Lake Pontchartrain in Louisiana to the Suwannee River in Florida. Currently, the smalltooth sawfish is predominantly distributed in the nearshore waters of south Florida (FWS and Gulf States Marine Fisheries Commission, 1995; NMFS, 2009). The essential fish habitat (EFH) for the oceanic whitetip shark in the project area includes localized areas in the central Gulf and Florida Keys. Although no EFH or critical habitat has been designated, the giant manta rays are widespread in the region. Giant manta rays occupy tropical, subtropical, and temperate oceanic waters and productive coastlines and are commonly found offshore in oceanic waters but are sometimes found feeding in shallow waters (less than 10 m) during the day (Miller and Klimovich, 2016).

Non-ESA-Listed Species

Approximately 1,540 species of fishes are recorded in the region and Florida Keys (McEachran, 2009). NOAA, working with the South Atlantic and Gulf of Mexico Fishery Management Councils, manage 71 and 40 fish and crustacean species, respectively, within the Federal waters of the Gulf. Distinctive fish assemblages are recognized within broad habitat classes including demersal (soft bottom and hard bottom), coastal pelagic, and oceanic pelagic (epipelagic and midwater) species. Fish are also classified by their movement patterns. Billfishes (marlins and sailfish), swordfish, tuna, and many shark species are considered highly migratory, as they are widely distributed geographically and occur from coastal waters seaward into the open ocean. Highly migratory species move vertically in the water column to feed, usually on a daily basis, and move great geographic distances for feeding or reproduction (NMFS, 2006). An example is the Atlantic bluefin tuna, which are known to use the Gulf in the spring for spawning grounds (Teo et al., 2007a and 2007b; Teo and Block, 2010).

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MFCMA), as amended in 1996 by the Sustainable Fisheries Act, mandates that the regional Fishery Management Councils, through Fishery Management Plans, describe and identify EFH for each federally managed species, minimize adverse effects on such habitat caused by fishing, and identify other actions that encourage the conservation and enhancement of such habitats. Almost the entire Gulf is within a designated EFH. Further, the regional Fishery Management Council amended their plans (referred to as Generic Amendment Number 3, 2005) to more specifically designate that habitats less than 100 fathoms (600 ft) are identified and described as EFH.

Fish Hearing

All fish species have hearing and skin-based mechanosensory systems (inner ear and lateral line) used to detect sound in their environment (Fay and Popper, 2000; Popper, 2003). These sounds may be produced by other fish, other organisms (e.g., snapping shrimp, marine mammals), or other naturally occurring sounds such as waves breaking on the shore, rain on the water surface, etc. Many Gulf fish species are known to actively use sound to mediate specific behaviors (e.g., spawning). Anthropogenic (human-generated) sounds may affect fishes through auditory masking, behavioral modification, temporary hearing loss, or physiological injury. Masking of important environmental sounds or social signals could potentially reduce foraging success, increase predation, or disrupt reproduction. Studies suggest responses to anthropogenic sound can vary, even among members of a species. However, startle responses generally include avoidance behaviors away from adverse conditions. Responses may also vary with duration and frequency of exposure to a given signal. Fishes in close proximity to intense sound sources may experience temporarily reduced hearing sensitivity or TTS. These effects depend upon the type of sound, duration of sound, distance of sound, and fish species (Popper and Hastings, 2009). Injury to fishes as a result of rapid changes in pressure (barotrauma) may occur in close proximity to an intense sound source.

Hearing mechanisms in fishes have been studied extensively (Fay and Popper, 2000; Ladich and Popper, 2004; Webb et al., 2008), but the specific capabilities of species and the received-sound levels where potentially adverse impacts may occur are not well known. Furthermore, Popper and Fay (2011) suggest the broad designation of fishes as “hearing specialists” and “hearing generalists” is not sufficient to classify the hearing abilities of fishes. They recommend that the range of hearing capabilities across species is more like a continuum that includes the relative contributions of hydrostatic pressure to the overall hearing capabilities of a species. Although studies have investigated physiological impacts (McCauley et al., 2000a; McCauley et al., 2003) and behavioral response (Skalski et al., 1992; Engås et al., 1996; Slotte et al., 2004; Løkkeborg et al., 2012; Fewtrell and McCauley, 2012) in several species, results are generally inconclusive and cannot be applied at the population level (National Science Foundation, 2011). However, information gaps are widely recognized (Hawkins et al., 2014; Popper et al., 2014) and broad guidance has been developed to minimize potential impacts to fishes and sea turtles resulting from anthropogenic sound exposure. The sections below provide a synopsis of the available information relevant to the effects on fish from exposure to seismic and other anthropogenic sound.

3.4.2. Impact Analysis

Distinctive fish assemblages can be found within a broad range of habitats in continental shelf and oceanic waters. The IPFs associated with the proposed action that could affect fish include (1) active acoustic sound sources, (2) vessel noise, and (3) vessel traffic. The GOM G&G PEIS contains a discussion of the potential impacts from survey operations on fish resources. Additional information about routine impacts from oil and gas activity on fish is addressed in the relevant NEPA compliance documents. The discussions are summarized below and are incorporated by reference into this SEA.

3.4.2.1. Alternative 1

If Alternative 1, the No Action Alternative, is selected the applicant would not undertake the proposed activities; therefore, the IPFs to fish would not occur. For example, there would be no seismic airgun noise that would result in behavioral change, masking, or non-auditory effects to the animals, no long-term or permanent displacement of the animals from preferred habitats, and no destruction or adverse modification of any habitats.

3.4.2.2. Alternative 2

If Alternative 2, the Proposed Action as Submitted, is selected the applicant would undertake the proposed activities as requested and conditioned in the application. As described in the analyses below, impacts to fish from the proposed action (e.g., hearing loss or behavioral disruption from seismic noise), are expected to be short-term, localized and not lead to significant impacts. Although the COAs and monitoring measures outlined in **Chapter 2.4** and discussed in the marine mammal and sea turtle sections are requisite for permit approval, their implementation will not increase or decrease the potential for effects to fish from the proposed action.

3.4.2.3. Alternative 3

If Alternative 3, the Proposed Action with COAs, is selected the applicant would undertake the proposed activities as requested and conditioned in the application; however, the applicant would be required to undertake COAs and monitoring measures as identified by BOEM and in compliance with the 2025 NMFS BiOp consultation requirements. As described in the analyses below, impacts to fish from the proposed action (e.g., hearing loss or behavioral disruption from seismic noise), are expected to be short-term, localized and not lead to significant impacts. Although the COAs and monitoring measures outlined in **Chapter 2.4** would be included, their implementation would not increase or decrease the potential for effects to fish from the proposed action.

Potential Impacts to Fish from Active Acoustic Sound Sources

Fish ears respond to changes in pressure and particle motions (van Bergeijk, 1967; Schuijf, 1981; Kalmijn, 1988 and 1989; Schellert and Popper, 1992; Hawkins, 1993; Fay, 2005). Fish exposed to natural or manmade sound may experience physical and behavioral effects, ranging in magnitude from negligible to severe. The four areas of primary concern for fish exposed to elevated noise levels include: (1) hearing loss, (2) behavioral response, (3) masking, and (4) non-auditory effects.

Hearing Loss

To result in hearing loss, a sound must exceed the specific hearing threshold of that fish for a certain period of time (Popper, 2005). The consequences of temporary or permanent hearing loss in individual fish or a fish population is largely unknown. However, it likely depends upon the number of individuals affected and whether critical behaviors involving sound (e.g., predator avoidance, prey capture, orientation and navigation, and reproduction) are adversely affected.

McCauley et al. (2003) found that caged pink snapper exposed to airgun sounds (600 pulses with peak-to-peak source levels of approximately 223 dB re 1 µPa-m) experienced observable anatomical damage to the auditory structures and that this damage did not repair 58 days after exposure. The damage as quantified by missing hair cells was relatively low, but the potential for impaired function in the remaining cells and the wider implications of potentially reduced fitness were not tested. Popper et al. (2005) documented TTS of northern pike and lake chub in the Mackenzie River Delta but found that broad whitefish receiving a source level of 177 dB re 1 $\mu Pa^2 \cdot s$ (decibels referenced to 1 microPascal squared, times seconds) showed no TTS. In both cases, the repetitive exposure to sound was greater than is expected in a typical seismic survey. Fishes involved in the study by Popper et al. (2005) were examined for damage to the sensory cells of the inner ear as a result of exposure to seismic sound, and no damage was observed (Song et al., 2008).

Behavioral Response

Behavioral effects from seismic noise on fishes can include changes in distribution, migration, mating, and ability to be caught. In general, any adverse effects on fish behavior or fisheries due to G&G surveys may depend on the species in question and the nature of the fishery (i.e., season, duration, and fishing method). Responses may also depend on the age of the fish, motivational state, size, and numerous unknown factors that are difficult, if not impossible, to quantify. Studies investigating the effects of sound (including seismic survey sound) on fish behavior were conducted on both uncaged and caged individuals (Chapman and Hawkins, 1969; Pearson et al., 1992; Santulli et al., 1999; Wardle et al., 2001; Hassel et al., 2003; Boeger et al., 2006) noted that fish typically exhibited a sharp “startle” response at the onset of a sound, followed by a return to normal behavior after the sound ceased. Investigation by Jorgenson and Gyselman (2009) indicated that behavioral characteristics of Arctic riverine fishes were generally unchanged by exposure to airgun sound.

Disturbance to fish population structures and distributions could result in reduced catch. An example would be temporary displacement of fish from traditional fishing grounds. Hirsh and Rodhouse (2000) reviewed studies investigating the hypothesis that seismic survey sounds have a deleterious effect on (usually commercial) fishing success. In most cases, these studies (e.g., Skalski et al., 1992; Engås et al., 1996) found that fishing catch of one or more target species declined with the onset of seismic survey operations and remained depressed throughout this activity and for days after. These effects, as reviewed in Boertmann et al. (2010), depend on species, fishing gear, and other environmental parameters. Further, reduced catch rates have been reported in some marine fisheries during seismic surveys; in several cases the findings are confounded by other sources of disturbance (Dalen and Raknes, 1985; Dalen and Knutsen, 1986; Løkkeborg, 1991; Skalski et al., 1992; Engås et al., 1996). No change was determined in catch-per-unit-effort of fish when airgun pulses were emitted, particularly in the immediate vicinity of the seismic survey (Pickett et al., 1994; La Bella et al., 1996; Wardle et al., 2001). For certain species, reductions in catch may have resulted from a change in behavior of the fish, such as a change in vertical or horizontal distribution (Slotte et al., 2004) and simply coincided with the seismic work.

Masking

Masking is defined as the effect of an acoustic source interfering with the reception and detection of an acoustic signal or other sound of biological importance to a receiver. Any sound within an animal’s hearing range can mask relevant sounds. Theoretically, the airguns or airgun arrays and vessel sound could contribute minimally to localized, short-term, and transitory masking of sound detection by some marine fishes, at least those species whose sound detection capacities are in the frequency range of the seismic survey sound source(s). However, there have been no documented studies concluding that seismic surveys resulted in the masking of any biologically relevant sounds for any fish species. This is most likely due to the roving nature of the G&G surveys or the limited exposure area where survey-related energy can be found. For example, some surveying technologies (e.g., vibroseis) may have operational frequencies or cycles that present an increased potential for locally masking biologically relevant sounds. For a discussion of the biological relevance of ambient and signal sounds to fish, see Fay and Popper (2000).

Non-Auditory Effects

Existing research suggests there is a potential for non-auditory injury or mortality of fish in the immediate vicinity of a high-energy acoustic source. Airguns and airgun arrays may potentially injure or kill fishes within several meters at the time of discharge (Kostyvchenko, 1973; Dalen and Knutsen, 1986; Booman et al., 1996; Dalen et al., 1996). The potential for injury is greater among fishes with trapped gas pockets or swim bladders that expand and contract with the ambient pressure changes. There are few studies that specifically investigate the effects of airgun sound on fish larvae and eggs, but existing research suggests these life stages are no more vulnerable to intense sound than adult fishes. Other studies document no egg, larvae, or fish mortality resulting from exposure to seismic sources (Falk and Lawrence, 1973; Holliday et al., 1987; La Bella et al., 1996; Santulli et al., 1999; McCauley et al., 2000a and 2000b; Thomsen, 2002; Hassel et al., 2003; McCauley et al., 2003; Popper, 2005; Payne et al., 2009).

Physiological effects may also include cellular and/or biochemical responses by fish to acoustic stress. Such stress potentially affects fish by increasing mortality or reducing reproductive success. However, primary and secondary stress responses of fish after exposure to seismic survey sound appear temporary (Sverdrup et al., 1994; McCauley et al., 2000a and 2000b). The periods necessary for these biochemical changes to return to normal are variable and depend on numerous aspects of the biology of the species and of the sound stimulus. The effects to fish from acoustic sound sources are expected to be **nominal**.

Potential Impacts to Fish from Vessel Noise

Within the area of the proposed action, the Gulf sturgeon may be exposed to vessel noise when support vessels transit across their habitat. While the Gulf sturgeon may be able to detect passing vessels, they are not expected to be affected by the sound. Therefore, the effects to fish from vessel noise are expected to be **nominal**.

Potential Impacts to Fish from Vessel Traffic

In the last five-year NMFS species review, vessel strikes were identified as an emerging threat for Gulf sturgeon. The operator is required to adhere with the mitigation and monitoring measures provided in the 2025 NMFS BiOp under the Vessel Strike Avoidance and Injured and/or Dead Aquatic Protected Species Reporting Protocols. Compliance with the regulations as clarified in the 2025 NMFS BiOp should reduce or avoid impacts from vessel strikes under this alternative. With these COAs and monitoring measures in place, the impacts to the Gulf sturgeon and other fish species are expected to be **nominal.**

Conclusion

Noise from the proposed action could potentially result in acute injury and mortality of a minimal number of individuals of some species of fish, their larvae, and/or eggs when in very close proximity to a high-energy acoustic source. The proposed action may result in short-term, localized behavioral reactions. Highly migratory species like the bluefin tuna are found in the proposed action area at certain times of the year. However, given the small area and timeframe exposed to seismic noise under the proposed action, the transience of the moving seismic source relative to the region, and the small number of fish potentially within this localized area, the chance of non-auditory injury or mortality would be limited to an insignificant number of individuals. Seismic effects on such a small number of individuals would be insignificant at the population scale and considerably smaller than the natural mortality rate. Therefore, based on the limited best available science, seismic surveys are not expected to result in significant auditory or non-auditory injury or mortality on marine fish at the population scale. Finally, the frequency range of some G&G survey equipment (e.g., airguns) overlaps with the likely hearing range of the ESA-listed fish species; however, these species are not routinely found beyond state waters. Therefore, impacts to fish resources from the proposed activity would be **nominal**.

3.4.3. Cumulative Impact Analysis

Cumulative impacts on fish and EFH that result from oil and gas leasing, exploration, development, and production activity including G&G activities are discussed in the GOM G&G PEIS, Multisale EIS, 2018 SEIS, and 2023 SEIS. The information from these documents is incorporated by reference in this SEA.

Activities considered under the cumulative scenario include the oil and gas program and other anthropogenic and natural activities, including the proposed action, may affect fish and fisheries. Degradation of water quality from multiple human activities as described in the GOM G&G PEIS, Multisale EIS, 2018 SEIS, and 2023 SEIS will continually affect fish and fisheries species. The cumulative impact of these ongoing OCS activities on fish and fisheries is expected to result in a number of chronic and sporadic lethal and sublethal (behavioral effects and nonfatal exposure to or intake of OCS-related contaminants or discarded debris) effects that may stress and/or weaken individuals of a local group or population and predispose them to infection from natural or anthropogenic sources. Finally, non-anthropogenic sources such as red tides and tropical storms may add to the cumulative impacts on fish resources in the northern Gulf. The proposed action is

a short-term event in a portion of the region; therefore, the effects from the proposed action will be slight in relation to these ongoing impacts.

The net result of any disturbance depends upon the size and percentage of the population likely to be affected, the ecological importance of the disturbed area, the environmental and biological parameters that influence an animal's sensitivity to disturbance and stress, and the accommodation time in response to prolonged stress.

Conclusion

The effects of the proposed action, when viewed in light of the effects associated with other relevant activities, may impact fish and fisheries. However, given the scope of the proposed action, incremental effects from the proposed seismic activities on fish and fisheries will be **nominal**.

3.5. Benthic Communities (Including Protected Corals)

3.5.1. Description

For purposes of OCS activity impact analyses, BOEM defines "shallow water benthic communities," to include hard bottom benthic communities and habitat, commonly termed Potentially Sensitive Benthic Features (PSBFs), found in water depths up to 984 ft (300 m) (BOEM, 2017b and c). Some PSBFs are identified as Topographic Features, Pinnacle Trend Features, or Low Relief Live Bottom Features, all of which have specific protections assigned to them (refer to NTL 2009-G39).

A description of benthic communities in the region can be found in the relevant NEPA compliance documents. The following information is a summary of the descriptions in the EISs, and it is incorporated by reference into this SEA.

The vast majority of the Gulf has a soft, muddy bottom in which burrowing infauna are the most abundant invertebrates. The analysis for this SEA will focus on the hard bottom communities due to the ubiquitousness of soft bottom in the region.

Naturally occurring geological (exposed bedrock) or biogenic (authigenic carbonate relict reef) seafloor with measurable vertical relief serves as important habitat for a wide variety of sessile and mobile marine organisms in the region. Encrusting algae and sessile invertebrates such as corals, sponges, sea fans, sea whips, hydroids, anemones, ascidians, and bryozoans may recruit to and colonize these hard substrates, creating "live bottom" (Cummins Jr. et al. 1962). Corals and large sponges function as structural architects, adding complexity to the benthic habitat.

Elkhorn (*Acropora palmata*), staghorn (*Acropora cervicornis*), boulder star (*Orbicella franksi*), lobed star (*Orbicella annularis*), mountainous star (*Orbicella faveolata*), rough cactus (*Mycetophyllia ferox*), and pillar (*Dendrogyra cylindrus*) corals are listed under the ESA as threatened due to the decrease in their population sizes. Distribution of those listed species within the U.S. Exclusive Economic Zone (EEZ) ranges from the State of Florida to the Flower Garden Bank National Marine Sanctuary (FGBNMS) and the U.S. territories of Puerto Rico, U.S. Virgin Islands, and Navassa Island. Critical habitat was designated for the elkhorn and staghorn coral species by NMFS in 2008 and includes four counties in Florida (i.e., Palm Beach, Broward, Miami-Dade, and Monroe Counties) (NMFS, 2008). In September 2023, NMFS designated critical habitat for five threatened Caribbean coral species (e.g., *Orbicella annularis*, *O. faveolata*, *O. franksi*, *Dendrogyra cylindrus*, and *Mycetophyllia ferox*) pursuant to Section 4 of the ESA (NMFS, 2023d). Twenty-eight mostly overlapping areas within the species' ranges in Florida, Puerto Rico, the U.S. Virgin Islands, Navassa Island, and the FGBNMS were identified to contain the features essential for the reproduction, recruitment, growth, and maturation of the listed corals. *Orbicella annularis*, *O. faveolata*, and *O. franksi* are found within the designated critical habitat within the FGBNMS.

The shallow-water coral reefs in the region occupy roughly 1,019 square miles (mi^2) (2,640 square kilometers (km^2)) of the entire Gulf (<0.2% of the area), with the largest distribution along the Florida coast (Tunnell et al., 2007). Coral reefs provide key ecosystem functions, including coastal

protection from storms and erosion, habitat, and spawning and nursery grounds for numerous fishes, as well as human ecosystem functions like tourism, fishing, and recreation. More detail can be found in the 2021 BEBR.

3.5.2. Impact Analysis

A detailed impact analysis of the routine, accidental, and cumulative impacts of the proposed activities on shallow water benthic communities can be found in the relevant NEPA compliance documents and are incorporated by reference into this SEA.

Any hard substrate communities located in shallow water would be particularly sensitive to impacts from OCS activities resulting in bottom disturbances and increased turbidity. Such impacts to these habitats could permanently prevent recolonization by similar organisms requiring hard substrate. The IPF associated with the proposed activities that could affect deepwater benthic communities include physical impacts from placement and recovery of OBNs.

3.5.2.1. Alternative 1

If Alternative 1, the No Action Alternative, is selected the applicant would not undertake the proposed activities. Therefore, the IPF to shallow water benthic communities would not occur. For example, there would be no bottom impacts that could result in physical damage to the benthic communities or their substrates.

3.5.2.2. Alternative 2

If Alternative 2, the Proposed Action as Submitted, is selected the applicant would undertake the proposed activities as requested and conditioned in the application. An example of potential impacts to shallow water benthic communities without implementation of the COAs and monitoring measures noted in **Chapter 2.4** and the following analysis includes, but is not limited to, physical damage to shallow water benthic communities or their substrates from the proposed survey activities. The operator proposes seismic survey activities with OBNs as receivers at sites that are located near potential and/or confirmed shallow water benthic communities which, without additional measures, may lead to potential impacts to those sites.

3.5.2.3. Alternative 3

If Alternative 3, the Proposed Action with COAs, is selected the applicant would undertake the proposed activities, as requested and conditioned in the application; however, the applicant would be required to undertake COAs and monitoring measures as identified by BOEM. The measures outlined in **Chapter 2.4** are expected to decrease or negate the potential for impact to shallow water benthic communities from the proposed action. For the reasons set forth below, inclusion of these measures under Alternative 3 further limits or negates potential impacts to shallow water benthic communities.

Potential Impacts on Deepwater Benthic Communities from Bottom Disturbances

As described in **Chapter 2** of this SEA, the applicant proposes to conduct seismic survey activities that will involve the placement of OBNs, disturbing the seafloor in the area of the proposed action. If the OBNs are deployed near or atop a confirmed or potential shallow water benthic community, impacts to these sensitive habitats could permanently prevent recolonization by similar organisms.

If a shallow water benthic community is subjected to impacts by bottom-disturbing activities, potentially severe or catastrophic impacts could occur due to direct impingement by a receiver or partial to complete burial due to resuspension of sediments. The severity of such an impact could be immediate loss of the community or incremental losses of productivity, reproduction, community relationships, leading to degradation of the overall ecological functions of the community and incremental damage to surrounding communities.

However, the offsets to OBN positioning proposed by BOEM will allow for deployment of the required OBNs within the demonstrated capability of the operator and provides for buffering of the seafloor disturbances caused by deployment. This condition of approval ensures the potential

for impacts resulting from the proposed survey activities are minimal. The effects to benthic communities from bottom disturbances are expected to be **nominal**.

Conclusion

Features capable of supporting shallow water benthic communities are located within the survey area. If the proposed bottom positioned receivers were to contact one of the features, it would have the potential to destroy any sessile organisms that may be present or cause destruction of underlying structures on which organisms rely for substrate. These impacts could be severe in the immediate area. The proposed activities may impact the ecological function, biological productivity, or distribution of hard-bottom shallow water benthic communities. Burial or disruption of the organisms from redistribution of bottom sediment or increased turbidity from resuspended sediment may foul or otherwise interfere with filter-feeding organs.

Recruitment of new organisms from nearby communities and settlement of organisms in areas with exposed hard ground may take years to decades to become established, if ever. With this in mind, BOEM uses COAs and monitoring measures applied to permits to preserve such undisturbed areas. The COAs and monitoring measures outlined in **Chapter 2.4** would help assure sources for colonizing larvae and protect existing habitat. Impacts to hard-bottom communities are expected to be avoided as a consequence of compliance with existing BOEM regulations and adherence by the operator to the conditions of approval and monitoring measures.

Sensitive sessile benthic resources could occur in the vicinity of the proposed activities; with operator adherence to the measures in **Chapter 2.4**, the proposed activities are not expected to impact either known or probable areas of shallow water benthic communities.

3.5.3. Cumulative Impact Analysis

Considering the location of these habitats, the operator's proposed activities would constitute the primary effect on the resources that may exist in the area of the proposed action. As such, the potential cumulative impacts from all other activities would be identical to the effects described above. Given the negligible impacts on shallow water benthic communities, because of the application of BOEM avoidance criteria as described in NTL No. 2009-G39 and the applied mitigations, the cumulative impacts are also **nominal.**

Conclusion

The effects of the proposed action, when viewed in light of the effects associated with other relevant activities, may impact shallow water benthic communities. However, given the scope of the proposed action and conservative nature of the applied conditions of approval, incremental effects from the proposed survey activities on shallow water benthic communities will be **nominal**.

The proposed activities are expected to have negligible impacts on the ecological function, abundance, productivity, and/or distribution of shallow water benthic communities given adherence to distancing requirements found in NTL No. 2009-G39 and the applied mitigations. The operator's plan proposes compliance with the regulations as clarified by NTL No. 2009-G39 and the applied mitigations. Bottom disturbances from nodal placement would be sited away from any sensitive deepwater benthic communities. Any sediments or fluids that could come in contact with the organisms would be diluted to a concentration where the impact to the shallow water benthic community would be **nominal**.

3.6. ARCHAEOLOGICAL RESOURCES

3.6.1. Description

Archaeological resources are defined in 30 CFR § 550.105 as, "…the material remains of human life or activities that are at least 50 years of age and that are of archaeological interest, including any historic property described by the National Historic Preservation Act, as defined in 36 CFR § 800.16(l)." Archaeological interest means that it is capable of providing scientific or humanistic understanding of past human behavior, cultural adaptation, and related topics through the

application of scientific or scholarly techniques, such as controlled observation, contextual measurement, controlled collection, analysis, interpretation, and explanation.

As obligated under OCSLA regulations (30 CFR § 551.6(a)(5)), applicants are not allowed to disturb archaeological resources while conducting their survey activities. The description of archaeological resources (pre-contact and historic) can be found in the GOM G&G PEIS, Multisale EIS, 2018 SEIS, and 2023 SEIS. The following information is a summary of these descriptions and is incorporated by reference into this SEA.

Pre-contact

Pre-contact Native American sites may exist on the OCS dating from the time at the end of the last Ice Age (~20,000 – 22,000 years ago), when sea levels were about 427 feet (130 meters) lower than they are today. Based on our current understanding of the archaeological and geological evidence, BOEM has adjusted, over time, its understanding of when and where people may have lived on the OCS when it was a terrestrial landform. Based on this evidence, consultations with Native American Tribes, advances in remote sensing technology, and new coring methodologies to locate submerged ancient landforms, BOEM has updated the depth within the Gulf where remote sensing surveys for ancient landforms are required (from the previous depth of 60 m to 130 m [200 to 427 ft]).

Historic

Submerged historic archaeological resources in the OCS and along the Gulf Coast consist mostly of historic shipwrecks and historic aircraft. A historic shipwreck is defined as a submerged or buried vessel or its associated components, at least 50 years old, that has foundered, stranded, or wrecked, and that is currently lying on or embedded in the seafloor. A proprietary database of shipwrecks maintained by BOEM currently lists over 1,300 named shipwrecks in the Gulf. Many of these reported shipwrecks may qualify for listing on the National Register of Historic Places. Although a number of shipwrecks have been identified based on historical documents, there are many others that have yet to be located and many more still for which no record of their loss survives and whose identity and location remains unknown. Currently a high-resolution remote sensing survey is the most reliable method for identifying and avoiding historic archaeological resources.

At present, high-resolution geophysical, ROV, and/or diver survey is required for all new bottom disturbing activities by the oil and gas industry. Historic shipwrecks have, with the exception of three significant vessels found by treasure salvers, been primarily discovered through oil industry sonar surveys in water depths up to 11,000 ft (3,353 m). The preservation of historic wrecks found in deep water has been outstanding because of a combination of environmental conditions and limited human access.

3.6.2. Impact Analysis

The IPF associated with the proposed action that could affect archaeological resources is seafloor disturbance from the placement and recovery of OBNs. Available literature is not sufficient to identify historic shipwreck losses in the area of the proposed action as historic records of losses occurring this far offshore are not location-specific (Pearson et al., 2003; Krivor et al., 2011; Rawls and Bowker-Lee, 2011). However, if a historic resource exists in the survey area, direct physical contact with a shipwreck site could destroy fragile materials, such as hull remains or artifacts, and could disturb the site context (Atauz et al., 2006; Church and Warren, 2008).

The IPF that could be associated with accidental events include seafloor disturbances from jettisoned/lost debris. Similar to routine impacts, discarded/lost material that falls to the seabed has the potential to damage and/or disturb archaeological resources.

The GOM G&G PEIS contains a discussion of the potential impacts from survey operations on archaeological resources (BOEM, 2017a). Additional information about routine impacts from oil and gas activity on archaeological resources is addressed in the Multisale EIS, 2018 SEIS, and 2023 SEIS. The following information is a summary of the impact analyses and is incorporated by reference into this SEA.

3.6.2.1. Alternative 1

If Alternative 1, the No Action Alternative, is selected the applicant would not undertake the proposed activities; therefore, the impacts to archaeological resources would not occur. For example, there would be no bottom impacts from OBN placement that could result in potential loss of any known or unknown historic archaelogical resource.

3.6.2.2. Alternative 2

If Alternative 2, the Proposed Action as Submitted, is selected the applicant would undertake the proposed activities as requested and conditioned in the application. An example of potential impacts to archaeological resources would include, but is not limited to, damage to potential archaeological resources from the proposed survey activities. The operator proposes seismic survey activities with OBNs as receivers at sites that are located near potential and/or confirmed archaeological resources which, without additional conditions of approval and monitoring measures, may lead to potential impacts to those sites.

3.6.2.3. Alternative 3

If Alternative 3, the Proposed Action with COAs, is selected the applicant would undertake the proposed activities as requested and conditioned in the application; however, the applicant would be required to undertake COAs and monitoring measures as identified by BOEM. The COAs and monitoring measures outlined in **Chapter 2.4** are expected to decrease or negate the potential for impact to archaeological resources from the proposed action. For the reasons set forth below, inclusion of these measures under Alternative 3 further limits or negates potential impacts to archaeological resources.

Routine Activities

Historic modeling assumes that shipwrecks would be found closest to shore along the Federal/State boundary or within ten mi (16 km) of their reported loss location. However high-resolution geophysical data acquired by oil and gas industry remote sensing surveys now indicate that this model is too limited. For example, several vessel casualties from World War II with historically reported coordinates were later discovered well over ten mi (16 km) outside the 9-mi^2 area assumed to be their location by the model (Irion, 2002). An early nineteenth century steamship lost off the Texas coast was found by treasure salvers over 120 mi (193 km) from the area of its presumed loss in the Minerals Management Service model (Irion, Official Communication, 2011). These situations, coupled with the fact that no confirmed historic shipwreck sites had been found in any of the designated historic high probability area in 20 years, led to a study released in 2003 (Pearson et al., 2003) to reassess the high-probability model. Some of the recommendations of this study were implemented in September 2024 with the revision of 30 CFR § 550.194 and 195. The current requirement is that all new bottom disturbing activity by the oil and gas industry be cleared by high-resolution geophysical, ROV, and/or diver survey.

Impacts to a historic site could result from direct physical contact with an OBN causing irreversible damage. The undisturbed provenience of archaeological data (i.e., the 3-dimensional location of archaeological artifacts) allows archaeologists to accumulate a record of where every item is found, and to develop a snapshot as to how artifacts relate to other items or the site as a whole. The analysis of artifacts and their provenience is one critical element used to make a determination of eligibility to the National Register of Historic Places under 30 CFR § 60.4 and is essential in understanding past human behavior and ways of life. Impacts from the proposed operations could alter the provenience and destroy fragile remains, such as the hull, wood, glass, ceramic artifacts and possibly even human remains, or information related to the operation or purpose of the vessel. The destruction and loss of this data eliminates the ability of the archaeologist to fully and accurately detail activity areas found at the site, variation and technological advances lost to history, the age, function, and cultural affiliation of the vessel, and its overall contribution to understanding and documenting the maritime heritage and culture of the region. Under Alternative 3, the operator is required to avoid known archaeological resources and cease operations should the operator discover an unknown, potential archaeological resource.

With the conditions of approval and monitoring measures in place under Alternative 3, the effects to archaeological resources are expected to be **nominal**.

Accidental Events

An IPF that could result from an accidental event is from the loss of debris from the survey and support vessels during survey operations. Debris such as structural components (i.e., grating, wire, tubing, etc.), boxes, pallets, and other loose items can become dislodged during heavy seas or storm events and fall to the seabed. Similar to the impacts noted under Routine Activities, if debris were to fall onto an unknown archaeological resource, damage could destroy fragile materials, such as hull remains and artifacts, and could disturb the site's context and associated artifact assemblage. Additionally, lost material could result in the masking of actual archaeological resources or the introduction of false targets that could be mistaken in the remote sensing record as historic resources.

3.6.3. Cumulative Impact Analysis

Cumulative impacts on unknown archaeological resources that may be present in the area of the proposed action could result from other activities such as commercial fishing, marine transportation, and adjacent oil and gas exploration, development, and production operations.

During adjacent oil and gas operations, commercial fishing, and maritime transportation activities, there is associated loss or discard of debris that could result in the masking of archaeological resources or the introduction of false targets that could be mistaken in the remote sensing record as historic resources. Future exploration, development, and production operations and/or any related infrastructure support could lead to bottom disturbances in the area of the proposed action; however, no additional activities have been proposed or are under review at this time.

Any known or unknown archaeological resources that may be present in the proposed survey area could be impacted by contact with oil from a blowout or spill from adjacent oil and gas operations. Similarly, cumulative impacts from accidental oil spills and remediation efforts for adjacent oil and gas operations are not expected because of the water depth at the proposed site and the historically low probability of a loss of well control/blowout.

Considering the potential cumulative impacts from all other activities, the operator's proposed activities would constitute the primary effect, if any, on any known or unknown archaeological resource that may exist in the area of the proposed action.

Conclusion

Based on the previous information, study conclusions, and the number of confirmed wrecks recently found in similar water depths, there is reason to believe that archaeological resources could be present in the area of the proposed action. Impacts may include damage and/or disturbance to the potential resources from OBN placement. Impacts from accidental events related to the proposed action such as debris lost from the survey and support vessels could lead to impacts similar to those expected from routine impacts. If the operator's seabed disturbing activities make contact with these targets, it might have a significant impact on the resources. The site-specific review of the proposed activity indicates that there are potential archaeological targets within the vicinity of the proposed OBN deployments. Based on the review findings, it is likely that submerged archaeological resources could exist in the area of the proposed action as targets have been identified in pre-existing survey data. Without necessary avoidance conditions of approval and monitoring measures, selecting Alternative 3 should not result in significant impacts to archaeological resources; the effects are expected to be **nominal**.

3.7. OTHER CONSIDERATIONS

A discussion of the other resources considered but not analyzed under this SEA is found in the GOM G&G PEIS, Multisale EIS, 2018 SEIS, and 2023 SEIS.

4. CONSULTATION AND COORDINATION

The information in this SEA was developed by BOEM subject matter experts and in consultation with other Federal agencies, the private sector, and academia personnel and is found in the GOM G&G PEIS, Multisale EIS, 2018 SEIS, and 2023 SEIS.

The ESA establishes a national policy designed to protect and conserve threatened and endangered species and the ecosystems upon which they depend. Section 7(a)(2) of the ESA requires each Federal agency to ensure that any action that they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the adverse modification of designated critical habitat. BOEM and BSEE engaged in consultation under the ESA with NMFS and FWS.

On April 20, 2018, the FWS issued a 10-year Biological Opinion (2018 FWS BO) for BOEM and BSEE activities on the OCS, including lease sales and approvals of all “on the water” activities during this time. The 2018 FWS BO does not include any terms and conditions for the protection of endangered species that BOEM, BSEE, the lessees, or operators must implement. The FWS also noted that any future consultations may be informal, dependent upon the likelihood of take of ESA-listed species under that Service’s jurisdiction (FWS, 2018). On March 6, 2024, BOEM and BSEE requested reinitiation of consultation with FWS regarding updated oil-spill risk analyses, new listings, and general species information. FWS requested additional information from BOEM and BSEE in a letter dated December 20, 2024; the bureaus responded on February 5, 2025. On March 28, 2025, the FWS sent BOEM a letter with its evaluation of the new information and data, and its determination that nothing considered during the reinitiated consultation changed the conclusions of the 2018 FWS BO and that no further ESA consultation with the Service for the proposed action is necessary. The 2018 FWS BO remains in effect and any future BO amendments or associated COAs will be binding on subsequent post-lease actions.

On May 20, 2025, the NMFS published their Biological and Conference Opinion on Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement’s Oil and Gas Program Activities in the Gulf of America and associated Attachments and Appendices (NMFS, 2025), which contain protocols BOEM applies for ESA compliance. The relevant terms and conditions and reasonable and prudent measures, as well as the provisions of the 2020 NMFS BiOp that are a part of the proposed action in the 2025 NMFS BiOp, and other protocols identified in the 2025 NMFS BiOp Attachments and Appendices are made a binding part of the lease in the “Protected Species” Stipulation. In addition, any future BiOp amendments or COAs will be binding on subsequent post-lease actions.

BOEM petitioned NMFS for rulemaking under the MMPA (16 U.S.C. §§ 1361 et seq.) relating to G&G surveys on the OCS in the Gulf. On January 19, 2021, NMFS published in the Federal Register a final Incidental Take Regulation (ITR), which became effective on April 19, 2021 (NMFS, 2021). A draft revision to this regulation that corrects some calculation errors and therefore adjusts taking allowable under the regulations was published on January 5, 2023 (NMFS, 2023a). On April 24, 2024, NMFS published in the Federal Register its final rule, “Taking and Importing Marine Mammals: Taking Marine Mammals Incidental to Geophysical Surveys in the Gulf of Mexico” (NMFS, 2024a). The rule is effective from May 24, 2024, through April 19, 2026. There are no changes to the specified activities or the specified geographical region in which those activities would be conducted, nor to the original 5-year period of effectiveness. A new request for MMPA authorization was prepared and submitted by industry in March 2025.

BOEM completed consultation with NOAA’s NMFS regarding the MFCMA on July 10, 2017, by the receipt of a comment letter from NMFS. The NMFS letter acknowledged their receipt of the EFH Assessment and the supporting 2017-2022 Multisale Lease NEPA document, provided a determination that the Programmatic Consultation was an appropriate mechanism to evaluate EFH impacts and confirmed the adoption of the BOEM/BSEE mitigation measures outlined in the June 8, 2016, BOEM EFH Assessment to ensure adverse impacts are avoided, minimized, and offset. This consultation remains in effect for 2017-2022 activities or earlier but not if modifications are made to the BOEM/BSEE programs that would result in changes to potential adverse effects on EFH which would trigger additional consultation.

In accordance with the National Historic Preservation Act (54 U.S.C. §§ 300101 et seq.), Federal agencies are required to consider the effects of their undertakings on historic properties. The implementing regulations for Section 106 of the National Historic Preservation Act, issued by the Advisory Council on Historic Preservation (36 CFR § 800), specify the required review process. In accordance with 36 CFR § 800.8(c), BOEM intends to use the NEPA substitution process and documentation for preparing an Environmental Impact Statement/Record of Decision or an Environmental Assessment/Finding of No Significant Impact to comply with Section 106 of the National Historic Preservation Act in lieu of 36 CFR § 800.3-800.6.

5. BIBLIOGRAPHY

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