

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT
NEW ORLEANS OFFICE
NEW ORLEANS, LOUISIANA

SITE-SPECIFIC ENVIRONMENTAL ASSESSMENT

OF

GEOLOGICAL & GEOPHYSICAL
SURVEY APPLICATION NO. L20-021

FOR

ECHO OFFSHORE LLC

October 15, 2020

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 Opinion of the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico
(NMFS March 13, 2020)

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

The Bureau of Ocean Energy Management (BOEM) has prepared a Site-Specific Environmental Assessment (SEA) (No. L20-021) complying with the National Environmental Policy Act (NEPA). NEPA regulations under the Council on Environmental Quality (CEQ) (40 CFR §1501.3 and § 1508.9), the United States Department of the Interior NEPA implementing regulations (43 CFR § 46), and BOEM policy require an evaluation of proposed major federal actions, which under BOEM jurisdiction includes approving a plan for oil and gas exploration or development activity on the Outer Continental Shelf (OCS).

NEPA regulation 40 CFR § 1508.27(b) requires significance to be evaluated in terms of context and intensity. The context and intensity of impacts caused by similar actions to that proposed were examined at a basin-wide scale in the Gulf of Mexico (GOM) 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 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), and
- Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico (2020 BO) (Issued by National Marine Fisheries Service [NMFS] March 13, 2020).

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

Proposed Action: Echo Offshore LLC (Echo) proposes to conduct a high resolution geophysical (HRG) survey as part of an archaeological investigation. A high-resolution sub-bottom profiler, side scan sonar, and multibeam echosounder will be utilized in the survey activities. The HRG survey is located in Ewing Bank Block 919 (outside of the fairway), with coverage extending into Ewing Bank Blocks 874, 875, and 918. The utility vessel, the *R/V Nikola*, will be used to conduct the survey. The *Artemis Bluefin 21* autonomous underwater vehicle (AUV) will be deployed from the utility vessel and will tow the survey components. The proposed activity is located south of Louisiana in the Central Planning Area of the GOM. The project area is approximately 69 miles (111 kilometers) from the nearest Louisiana shoreline and in water depths ranging from 787 – 1,837 feet (240 – 560 meters). Site-specific analysis was completed using Echo'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 two and a half days to complete.

Factors Considered in this Determination: The context and intensity of 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 HRG sound sources, (2) vessel noise, (3) vessel traffic, and (4) 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. BOEM has assessed the impacts of the proposed action on the following resources:

- marine mammals;
- sea turtles; and
- fish.

The noise generated from active acoustic sources (HRG sources) are potentially the most disruptive impact for a free-swimming individual or groups of marine mammals, turtles, and fish if they are in proximity to the source 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 or entangled by debris from the proposed action. Conditions of approval include the monitoring of an exclusion zone by a trained protected species observer for 30 minutes during pre-clearance. Impacts from the proposed activities to marine mammals, sea turtles, and fish have been mitigated to negligible.

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 action to proceed, provided that the specific conditions of approval 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 (BO) issued by the National Marine Fisheries Service on March 13, 2020. This includes mitigation, particularly any appendices to Terms and Conditions applicable to the plan, as well as record-keeping and reporting sufficient to allow BOEM and BSEE to comply with reporting and monitoring requirements under the BO; and any additional reporting required by BOEM or BSEE developed as a result of BO implementation. The NMFS BO may be found here: (<https://www.fisheries.noaa.gov/resource/document/biological-opinion-federally-regulated-oil-and-gas-program-activities-gulf-mexico>). The Appendices and protocols may be found here: (<https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-program-gulf-mexico>).
- **SUPPORT BASES AND VESSEL TRANSIT ROUTES:** Approval of your application is conditioned upon your use of the support bases and vessel transit routes as described in your application. BOEM/BSEE must be notified at least 15 days prior to any vessel route changes that require transit of the Bryde's Whale area, and you must receive prior approval for that transit from BOEM/BSEE.
- **SEISMIC SURVEY OPERATION, MONITORING, AND REPORTING GUIDELINES:** The applicant will follow the guidance provided under Appendix A. Seismic Survey Mitigation and Protected Species Observer Protocols found in the Biological Opinion issued by the National Marine Fisheries Service on March 13, 2020. The guidance can be accessed on NOAA Fisheries internet website at <https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-program-gulf-mexico>.
- **MARINE TRASH AND DEBRIS AWARENESS AND ELIMINATION:** The applicant will follow the protocols provided in Appendix B. Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols found in the Biological Opinion issued by the National Marine Fisheries Service on March 13, 2020. The Appendix can be accessed on NOAA Fisheries internet website at <https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-program-gulf-mexico>.
- **VESSEL-STRIKE AVOIDANCE/REPORTING:** The applicant will follow the guidance provided under Appendix C. Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols found in the Biological Opinion issued by the National Marine Fisheries Service on March 13, 2020. The Appendix can be accessed on the NOAA Fisheries internet site at <https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-program-gulf-mexico>.
- **SEA TURTLE RESUSCITATION GUIDELINES:** The applicant will follow the guidance provided under Appendix J. Sea Turtle Handling and Resuscitation Guidelines found in the Biological Opinion issued by the National Marine Fisheries Service on March 13, 2020. The guidance can be accessed on the NOAA Fisheries internet site at <https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-progr.am-gulf-mexico>.

- **SLACK-LINE PRECAUTIONS AND REPORTING REQUIREMENT:** If operations require the use of flexible, small diameter (< 1 in) nylon, plastic, or fiber lines to support operations (with or without divers), operators/contractors must reduce the slack in the lines to prevent accidental entanglement of ESA-listed species. The following measures are required (noting that diver safety is paramount, and the following measures should be followed only in cases where they do not jeopardize human safety):
 - Operators must utilize tensioning tools and/or other appropriate procedures to reduce unnecessary looseness in the lines and/or potential looping.
 - The lines must remain taut.
 - A line tender must be present at all times during dive operations and must monitor the line(s) the entire time a diver is in the water.
 - Should the line tender and/or diver become aware of any ESA-listed species entanglement, the following protocols must be followed as soon as safety permits.

Should an ESA-listed species interaction resulting in entanglement, entrapment and/or injury occur, the interaction must be reported immediately or after diver safety (if present) is ensured. For assistance with marine mammals contact the number(s) below:

Marine Mammals	
State Stranding Network	Telephone
Texas	800-962-6625
Louisiana	504-235-3005
Mississippi	888-767-3657
Alabama	877-942-5343
Florida	888-404-3922

* If you do not receive a response, go to the following website to ensure the listed number is correct: <https://www.fisheries.noaa.gov/report>

For assistance with sea turtles contact the number(s) below:

Sea Turtles	
State Stranding Network	Telephone
Texas	361-949-8173 x 226
Louisiana	844-732-8785
Mississippi	228-369-4796
Alabama	866-732-8878
Florida	888-404-3922

* If you do not receive a response, go to the following website to ensure the listed number is correct: <https://www.fisheries.noaa.gov/report>

Assistance with other ESA-listed species (e.g., giant manta ray, oceanic whitetip shark, or Gulf sturgeon) should contact the ESA section 7 biologist at 301-427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfs@noaa.gov.

After the appropriate stranding networks have been contacted for assistance, you may call BSEE at 985-722-7902 for questions or additional guidance on recovery assistance needs (if still required), continued monitoring requirements, and incidental report information which at minimum is detailed below.

Within 24 hours of any event or observation, notify NMFS at nmfs.psoreview@noaa.gov and BSEE at protectedspecies@bsee.gov with the following information:

1. Time, date, water depth, and location (latitude/longitude) of the first discovery of the interaction;
 2. Name, type, and call sign of the vessel (or platform) in which the event occurred;
 3. Species identification (if known) or description of the animal involved;
 4. Condition of the animal during the event;
 5. Photographs or video footage of the animal;
 6. Stranding network line that was contacted for assistance; and
 7. General narrative and timeline describing the events that took place.
- **HIGH RESOLUTION GEOPHYSICAL (HRG) SURVEY REQUIREMENTS:** The use of HRG equipment will require the following in accordance with the Terms and Conditions of the Biological Opinion (BO) issued by the National Marine Fisheries Service on March 13, 2020:
 - Pre-clearance watch is required for a period of 30 minutes and over a 200-m radius from the acoustic source.
 - When operating in waters shallower than 100 m, operators shall employ one visual PSO, which may be a crew member. PSOs employed during shallow-water HRG surveys are only required during a pre-clearance period.

Conclusion: BOEM has evaluated the potential environmental impacts of the proposed action. Based on SEA No. L20-021, BOEM has determined that the proposed action 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.

PERRY

BOUDREAUX

Digitally signed by PERRY BOUDREAUX
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Chief, Environmental Operations Section
Office of Environment
New Orleans Office
Bureau of Ocean Energy Management

October 15, 2020

Date

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**SITE-SPECIFIC ENVIRONMENTAL ASSESSMENT (SEA)
PREPARED FOR
ECHO OFFSHORE LLC
GEOLOGICAL AND GEOPHYSICAL SURVEY APPLICATION
NO. L20-021**

1. INTRODUCTION

Echo Offshore LLC (Echo) has submitted a permit application (L20-021) to conduct a geological and geophysical (G&G) survey on the Outer Continental Shelf (OCS) of the Gulf of Mexico (GOM). This Site-Specific Environmental Assessment (SEA) evaluates the specific impacts associated with Echo's proposed G&G survey activities. **Chapter 1.3** of this SEA provides specific details on the G&G activities proposed in Echo'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) (USDOJ, 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) (USDOJ, BOEM, 2017b),
- Gulf of Mexico Lease Sale Final Supplemental Environmental Impact Statement 2018 (2018 SEIS) (OCS EIS/EA BOEM 2017-074) (USDOJ, BOEM, 2017c),
- 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), and
- Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico (2020 BO) (Issued by National Marine Fisheries Service [NMFS] March 13, 2020).

“Tiering” is provided in the National Environmental Policy Act (NEPA) implementing regulations (40 CFR § 1502.20 and § 1508.28). It 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.

For this SEA, all of the analyses prepared in the GOM G&G PEIS, Multisale EIS, 2018 SEIS, FWS 2018 BO, and NMFS 2020 BO are sufficiently comprehensive and adequate to support decision making for Echo'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; and

Marine mammals, sea turtles, fish, 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.

Therefore, **Chapter 3** of this SEA will focus on how the new information relative to the cumulative environmental effects of this action. Where applicable, relevant affected environment discussions and impact analyses from the GOM G&G PEIS, Multisale EIS, 2018 SEIS, FWS 2018 BO, and NMFS 2020 BO are summarized and utilized for this site-specific analyses, and are incorporated by reference into this SEA. Relevant conditions of approval and monitoring measures identified in the GOM G&G PEIS, Multisale EIS, 2018 SEIS, FWS 2018 BO, and NMFS 2020 BO 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 § 551 and § 580. Specifically, 30 CFR § 551 regulates prelease G&G exploratory operations for oil, gas, and sulfur resources, and 30 CFR § 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 § 550, which applies to postlease 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 GOM resources from activities proposed in Echo's G&G survey permit application, No. L20-021, 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 GOM G&G PEIS, Multisale EIS, 2018 SEIS, FWS 2018 BO, or NMFS 2020 BO prepared since that time. 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 GOM G&G PEIS, Multisale EIS, 2018 SEIS, FWS 2018 BO, or NMFS 2020 BO. 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

Echo has submitted permit application L20-021 to conduct a G&G activity on the OCS. The permit application proposes to conduct a high resolution geophysical (HRG) survey utilizing a sub-bottom profiler, sidescan sonar, and a multibeam echosounder. This information can be utilized to evaluate the potential for archaeological resources on the OCS. Additional information regarding other survey activities can be found in Appendix F of 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, 43 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 action in Echo'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

Echo proposes to conduct a HRG survey as part of an archaeological investigation. A high-resolution sub-bottom profiler, side scan sonar, and multibeam echosounder will be utilized in the survey activities. The HRG survey is located in Ewing Bank Block 919 (outside of the fairway), with coverage extending into Ewing Bank Blocks 874, 875, and 918. The utility vessel, the *R/V Nikola*, will be used to conduct the survey. The *Artemis Bluefin 21* autonomous underwater vehicle (AUV) will be deployed from the utility vessel and will tow the survey components. The proposed activity is located south of Louisiana in the Central Planning Area of the GOM. The project area is approximately 69 miles (mi) (111 kilometers [km]) from the nearest Louisiana shoreline and in water depths ranging from 787 – 1,837 feet (ft) (240 – 560 meters [m]). Site-specific analysis was completed using Echo'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 two and a half days to complete (Echo, 2020).

Non-Airgun (Electromechanical) HRG Sources

In non-airgun HRG surveys, a high-resolution boomer, sparker, or CHIRP subbottom profiler is used to delineate near-surface geologic strata and features. Typical survey deployments also include single beam echo sounders (SBESs) or multi beam echo sounders (MBESs) and side-scan sonars, which often are towed on an autonomous underwater vehicle. These electromechanical sources may operate simultaneously with airguns during deep-penetration seismic surveys. The CHIRP systems are used for high-resolution mapping of relatively shallow deposits and have less penetration than boomers; however, newer CHIRP systems are able to penetrate to levels comparable to boomers yet yield extraordinary resolution of the substrate. These electromechanical sources have adjustable main operating frequency bands; however, they can be considered narrow band sources, as the acoustic energy emitted outside the main operating frequency band is nominal. Electromechanical sources can be highly directive, with beam widths as narrow as a few degrees or less (BOEM, 2017a).

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 investigation of archaeological resources, resulting in the potential damage of these resources in the United States OCS.

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 additional conditions of approval would be required by BOEM.

2.3. PROPOSED ACTION WITH ADDITIONAL 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 conditions of approval identified by BOEM, in coordination with NMFS and in accordance with the NMFS 2020 BO (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 geophysical data on the OCS. The information would not be available to industry and government to assist in their evaluation of archaeological resources 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 HRG data, as requested in the application, but would not include any conditions of approval or monitoring measures. 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). Alternative 2 would not require the implementation of conditions of approval and monitoring measures developed by BOEM, in coordination with the National Marine Fisheries Service (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 conditions of approval 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 NMFS 2020 Endangered Species Act (ESA) Section 7 Biological Opinion (BO) and BOEM is committed to requiring their implementation. NMFS provided a response to the Step-Down Review of L20-021 on October 7, 2020, in that, according to interim coordination procedures, that with implementation of the conditions of approval and monitoring measures below, the proposed action is within the scope of NMFS effects analysis considered for the most recent BO. Additionally, supplemental conditions of approval and monitoring measures were identified and will need to be imposed to provide further protection for marine mammals (see Chapter 3.2). The G&G activities proposed will provide Echo with sufficiently accurate data to determine the location, extent, and properties of potential archaeological resources in the GOM OCS.

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 (BO) issued by the National Marine Fisheries Service on March 13, 2020. This includes mitigation, particularly any appendices to Terms and Conditions applicable to the plan, as well as record-keeping and reporting sufficient to allow BOEM and BSEE to comply with reporting and monitoring requirements under the BO; and any additional reporting required by BOEM or BSEE developed as a result of BO implementation. The NMFS BO may be found here: (<https://www.fisheries.noaa.gov/resource/document/biological-opinion-federally-regulated-oil-and-gas-program-activities-gulf-mexico>). The Appendices and protocols may be found here: (<https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-program-gulf-mexico>).
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- **VESSEL-STRIKE AVOIDANCE/REPORTING:** The applicant will follow the guidance provided under Appendix C. Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols found in the Biological Opinion issued by the National Marine Fisheries Service on March 13, 2020. The Appendix can be accessed on the NOAA Fisheries internet site at <https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-program-gulf-mexico>.
- **SEA TURTLE RESUSCITATION GUIDELINES:** The applicant will follow the guidance provided under Appendix J. Sea Turtle Handling and Resuscitation Guidelines found in the Biological Opinion issued by the National Marine Fisheries Service on March 13, 2020. The guidance can be accessed on the NOAA Fisheries internet site at <https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-program-gulf-mexico>.
- **SLACK-LINE PRECAUTIONS AND REPORTING REQUIREMENT:** If operations require the use of flexible, small diameter (< 1 in) nylon, plastic, or fiber lines to support operations (with or without divers), operators/contractors must reduce the slack in the lines to prevent accidental entanglement of ESA-listed species. The following measures are required (noting that diver safety is paramount, and the following measures should be followed only in cases where they do not jeopardize human safety):
 - Operators must utilize tensioning tools and/or other appropriate procedures to reduce unnecessary looseness in the lines and/or potential looping.
 - The lines must remain taut.
 - A line tender must be present at all times during dive operations and must monitor the line(s) the entire time a diver is in the water.
 - Should the line tender and/or diver become aware of any ESA-listed species entanglement, the following protocols must be followed as soon as safety permits.

Should an ESA-listed species interaction resulting in entanglement, entrapment and/or injury occur, the interaction must be reported immediately or after diver safety (if present) is ensured. For assistance with marine mammals contact the number(s) below:

Marine Mammals	
State Stranding Network	Telephone
Texas	800-962-6625
Louisiana	504-235-3005
Mississippi	888-767-3657
Alabama	877-942-5343
Florida	888-404-3922

* If you do not receive a response, go to the following website to ensure the listed number is correct: <https://www.fisheries.noaa.gov/report>

For assistance with sea turtles contact the number(s) below:

Sea Turtles	
State Stranding Network	Telephone
Texas	361-949-8173 x 226
Louisiana	844-732-8785
Mississippi	228-369-4796
Alabama	866-732-8878
Florida	888-404-3922

* If you do not receive a response, go to the following website to ensure the listed number is correct: <https://www.fisheries.noaa.gov/report>

Assistance with other ESA-listed species (e.g., giant manta ray, oceanic whitetip shark, or Gulf sturgeon) should contact the ESA section 7 biologist at 301-427-8413 (nmfs.psoreview@noaa.gov) and report all incidents to takereport.nmfsser@noaa.gov.

After the appropriate stranding networks have been contacted for assistance, you may call BSEE at 985-722-7902 for questions or additional guidance on recovery assistance needs (if still required), continued monitoring requirements, and incidental report information which at minimum is detailed below.

Within 24 hours of any event or observation, notify NMFS at nmfs.psoreview@noaa.gov and BSEE at protectedspecies@bsee.gov with the following information:

1. Time, date, water depth, and location (latitude/longitude) of the first discovery of the interaction;
 2. Name, type, and call sign of the vessel (or platform) in which the event occurred;
 3. Species identification (if known) or description of the animal involved;
 4. Condition of the animal during the event;
 5. Photographs or video footage of the animal;
 6. Stranding network line that was contacted for assistance; and
 7. General narrative and timeline describing the events that took place.
- **HIGH RESOLUTION GEOPHYSICAL (HRG) SURVEY REQUIREMENTS:** The use of HRG equipment will require the following in accordance with the Terms and Conditions of the Biological Opinion (BO) issued by the National Marine Fisheries Service on March 13, 2020:
 - Pre-clearance watch is required for a period of 30 minutes and over a 200-m radius from the acoustic source.
 - When operating in waters shallower than 100 m, operators shall employ one visual PSO, which may be a crew member. PSOs employed during shallow-water HRG surveys are only required during a pre-clearance period.

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 of the GOM; 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 Echo's proposed survey activities will significantly impact the marine, coastal, or human environments of the GOM. For the impact analysis, resource-specific significance criteria were developed for each category of the affected environment. The criteria reflect consideration of both the context and intensity of the impact at issue (see 40 CFR § 1508.27). 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**; or
- **Negligible Impact**.

Preliminary screening for this assessment was based on a review of this relevant literature; previous SEAs; the GOM G&G PEIS (USDOJ, BOEM, 2017a); the Multisale EIS (USDOJ, BOEM, 2017b); the 2018 SEIS (USDOJ, BOEM, 2017c); the NMFS 2020 BO (USDOC, NMFS, 2020a); 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; and
- 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 (Chapter 3 of the GOM G&G PEIS; USDOJ, BOEM, 2017a). 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 Echo 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; and
- **Major:** impacts are detectable, long lasting, extensive, and severe.

The GOM G&G PEIS notes that seismic surveys have historically covered a large area of the GOM 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 seismic and geophysical 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 (see 40 CFR § 1508.27) or determined the resource would not be impacted by the proposed action. Such a procedure is consistent with the NEPA concept of tiering (40 CFR § 1502.20). 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);
- benthic communities;
- archaeological resources
- recreational and commercial diving;
- marine transportation;
- geology/sediments; and
- air and water quality.

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

- marine mammals (including threatened/endangered and non-ESA listed species);
- sea turtles (all are ESA listed species); and
- fish and fisheries (including listed species and ichthyoplankton).

3.2. MARINE MAMMALS

3.2.1. Description

The marine mammal community is diverse and distributed throughout the northern Gulf waters. The GOM's 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 GOM and are identified in the NMFS Stock Assessment Reports (SAR) (Jefferson et al., 2008; Davis et al., 2000; Roberts et al., 2016; Hayes et al., 2018; Hayes et al., 2019; Hayes, et al., 2020). A complete description of marine mammals can be found in Chapter 4.9 of the Multisale EIS and 2018 SEIS, in the NMFS 2017, 2018, and 2019 SAR (Hayes et al., 2018, 2019, 2020), and in the NMFS 2020 BO (USDOC, NMFS, 2020a), and are incorporated by reference.

Threatened or Endangered Marine Mammal Species

Only two cetaceans, the sperm whale (*Physeter macrocephalus*) and the GOM Bryde's whale (*Balaenoptera edeni*), regularly occur in the GOM and are listed as endangered under the ESA. On January 8, 2016 (81 FR 999), the United States Fish and Wildlife Service (FWS) issued a proposed rule and notice to reclassify the West Indian manatee from endangered to threatened (*Federal Register*, 2016) which was later issued as a Final Rule (82 FR 16668) on April 5, 2017 (*Federal Register*, 2017). On December 2, 1970, in the Final Rule (35 FR 18319), the sperm whale was listed as endangered throughout its range. The Final Rule (84 FR 15446) to list the GOM Bryde's whale as endangered was issued and became effective on May 15, 2019 (*Federal Register*, 2019). The only commonly occurring baleen whale in the northern

GOM is the Bryde's whale. Most sightings have been made in the De Soto Canyon region and off western Florida, although there have been some in the west-central portion of the northeastern GOM. The best estimate of abundance for Bryde's whales in the northern GOM is 33 individuals, which is the last estimate from a 2009 survey (Hayes et al., 2018 and 2020). Sperm whales in the GOM are not evenly distributed, showing greater densities in areas associated with oceanic features that provide the best foraging opportunities (USDOD, NMFS, 2020a).

Non-ESA-Listed Marine Mammal Species

Nineteen toothed cetaceans (including beaked whales and dolphins) regularly occur in the GOM 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 the following website: <https://www.fisheries.noaa.gov/national/marine-life-distress/active-and-closed-unusual-mortality-events>.

2018-2020 Southwest Florida Bottlenose Dolphin UME (UME 66)

Since July 2018, the 2018-2020 Southwest Florida Bottlenose Dolphin UME was issued because of elevated bottlenose dolphin mortalities. Southwest Florida has been experiencing an ongoing severe bloom of a red tide organism since November 2017. The results from several necropsies showed positive findings of red tide toxin (brevetoxin) indicating this UME is related to the bloom. Other species such as fish, sea turtles, and manatees have also been impacted by the algal bloom (USDOD, NMFS, 2020b). This UME and its associated investigation are on-going.

Marine Mammal Hearing

All marine mammals produce and use sound to communicate with another animal of the same species, to navigate and sense their environment, to locate and capture prey, and to detect and avoid predators (Southall et al., 2007 and 2019). The hearing of marine mammals varies based on individuals, absolute threshold of the species, masking, localization, frequency discrimination, and the motivation to be sensitive to a sound (Richardson et al., 1995). Southall et al. (2007) described the frequency sensitivity in five functional hearing groups of marine mammals by combining behavioral and electrophysiological audiograms with comparative anatomy, modeling, and response measured in ear tissues, which has been updated by Southall et al. (2019) to include six proposed hearing groups. For potentially affected marine mammal species in the GOM, the main functional hearing groups include: (1) low-frequency cetaceans with an estimated auditory bandwidth of 7 Hz to 35 kHz; (2) mid-frequency cetaceans with functional hearing of approximately 150 Hz to 160 kHz; and (3) high-frequency cetaceans with functional hearing estimated from 200 Hz to 180 kHz. These hearing sensitivity and frequency ranges are based on audiograms that are obtained by either: (1) behavioral testing on captive, trained animals; or (2) electrophysiological or auditory evoked potential (AEP) methods (Richardson et al., 1995). Currently, there are no behavioral or AEP audiograms for low-frequency cetaceans available. Audiograms, both behavioral and AEP, are available for some mid-frequency and high-frequency cetaceans (Richardson et al., 1995; Nedwell et al., 2004; Southall et al., 2007 and 2019; Au and Hastings, 2008).

3.2.2. Impact Analysis

The IPFs associated with the proposed action that could affect both ESA-listed and non-ESA-listed marine mammals are primarily active acoustic sound sources and vessel noise from survey activities, collisions with survey vessels, and marine trash and debris. Chapter 4.2 of the GOM G&G PEIS contains a discussion of the potential impacts from survey operations on marine mammal resources (USDOD, BOEM, 2017a). Additional information about routine impacts from oil and gas activity on impacts on marine mammals is addressed in Chapter 4.9 of the Multisale EIS and 2018 SEIS and the NMFS 2020 BO issued March 13, 2020. 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 HRG acoustic 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 towing of the HRG survey equipment, there would be no risk of collisions with marine mammals.

3.2.2.2. Alternative 2

If Alternative 2, the Proposed Action, 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 above referenced conditions of approval and monitoring measures include, but are not limited to: injury from vessel strikes, disruption of feeding and other behaviors from the HRG survey 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 Additional Conditions of Approval, is selected the applicant would undertake the proposed activities, as requested and conditioned in the application; however, the applicant would be required to undertake additional conditions of approval and monitoring measures as identified by BOEM, in coordination with NMFS and in accordance with the NMFS 2020 BO consultation requirements (i.e., Appendix A: Seismic Survey Mitigation and Protected Species Observer Protocols, B: Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols, and C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols). 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

Marine mammals exposed to natural or manmade noise may experience physical and psychological effects, ranging in magnitude from none to severe (Southall et al., 2007 and 2019). Four areas of primary concern for marine mammals exposed to elevated noise levels include the following: (1) permanent hearing loss; (2) temporary hearing loss; (3) behavioral response; and (4) masking (Nowacek et al., 2007). Other literature also suggests that there may be non-auditory effects, such as gas-bubble formation and stress.

Several electromechanical sound sources, including a 400-kHz side-scan sonar, and a 200-kHz CHIRP subbottom profiler, would operate within a frequency range that is inaudible to marine mammals within the GOM (BOEM, 2017a). Primary impacts to permanent and temporary hearing loss, behavioral response, and masking would not be expected. The operator is required to follow the HRG requirements listed in the conditions of approval outlined above and in the NMFS 2020 BO. These include the requirement to have a protected species observer (PSO) monitor the exclusion zone for 30 minutes during pre-clearance, which helps reduce the startle response of marine mammals in the area. The impacts from active acoustic sounds sources will have **negligible** effects.

Potential Impacts to Marine Mammals from Vessel Noise

The effects of noise produced by moving G&G survey vessels on marine mammals are difficult to assess because of the wide array of reports of their observed behavioral responses, both between and within species. Actual responses of individuals could vary widely and are heavily dependent on context (Richardson et al., 1995; Southall et al., 2007; Ellison et al., 2011). Vessel noise can have acute effects such as short-term behavioral and stress response. The nature of behavioral response cetaceans exhibit to vessels may depend on vessel speed, size, and distance from the animal, as well as the number and frequency of vessel encounters (USDOD, NMFS, 2020a). The dominant source of vessel sound from the proposed action is propeller cavitation, although other ancillary sounds may be produced (Richardson et al., 1995). The intensity of sound from vessels is related to size and speed. Large ships tend to be noisier than small ones and ships underway with a full load or towing/pushing produce more sound than unladen

vessels (USDOC, NMFS, 2020a). Noise from service-vessel traffic may elicit a startle and/or avoidance reaction from whales and dolphins or mask their sound reception (Tyack, 2008). Vessel noise from the proposed action will produce low levels of noise, generally in the 150 to 170 dB re 1 μ Pa-m at frequencies below 1,000 Hz. Vessel noise is transitory and generally does not propagate at great distances from the vessel. The NMFS 2020 BO concluded that the effects of vessel noise to sperm whales are not likely to adversely affect the species and Bryde's whales are likely to be adversely affected from vessel noise (USDOC, NMFS, 2020a). However, the proposed activities are located outside of the area where the Bryde's whale is likely to be present. The operator does not propose operations or support vessel traffic in the Bryde's whale area. The behavioral disruptions potentially caused by noise and the presence of vessel traffic will have **negligible** effects on cetacean populations in the northern GOM.

Potential Impacts to Marine Mammals from Vessel Traffic

Slow-moving cetaceans or those that spend extended periods of time at the surface, and deep-diving species (e.g., sperm whales) while on the surface, might be expected to be the most vulnerable to accidental vessel strike (Vanderlaan and Taggart, 2007). Smaller delphinids often approach vessels that are in transit to bow-ride; however, vessel strikes are less common for these faster moving mammals or are underreported (Wells and Scott, 1997). Florida manatees are commonly found in shallow coastal waters of Florida, but they have been found along the entire northern GOM from Florida to Texas (Fertl et al., 2005), though some recent deepwater sightings have occurred. Vessel strikes are the most common cause of human-induced mortality for manatees (State of Florida, Fish and Wildlife Conservation Commission, 2020), and most manatees bear prop scars from contact with vessels. The vast majority of strikes to manatees result from recreational and fishing vessels, not those related to oil and gas activities.

Worldwide, most vessel strikes of large whales occur when vessels are traveling at speeds greater than approximately 10 knots (Conn and Silber, 2013; Jensen and Silber, 2004; Laist et al., 2001; Vanderlaan and Taggart, 2007). If a vessel strike occurs, the animal may experience no injuries, minor non-serious injuries, serious injuries, or death, which largely depends on the size and speed of the vessel (USDOC, NMFS, 2020a). Both GOM Bryde's whales and sperm whales are vulnerable to vessel strikes. One confirmed vessel strike to a GOM Bryde's whale occurred in 2009. While there are no known recent vessel strikes to sperm whales, one possible lethal strike occurred in 1990 and a non-lethal strike in 2005. Additionally, a sperm whale is believed to have been struck by a U.S. Navy vessel in 2001 (USDOC, NMFS, 2020a).

The lack of response by sperm whales to oncoming vessels suggest the whales may not hear or see ships approaching or the whales are habituated to the high level of vessel operation activity in the GOM. The Bryde's whale spends much of its' time within 15 m of the water surface and at night on the surface, which makes it more likely to be struck by a vessel. With the Bryde's whale vessel strike mitigation measures required by the NMFS 2020 BO in place and as proposed under Alternative 3, NMFS estimated an annual rate of zero lethal Bryde's whale vessel strikes per year from oil and gas vessel traffic greater than 10 knots (USDOC, NMFS, 2020a). The proposed activities are located outside of the area where the Bryde's whale is likely to be present. The operator has not proposed any service vessels or vessel traffic within the Bryde's whale area. Under Alternative 3, the operator is required to notify BOEM 15 days prior to any vessel transit within the Bryde's whale area; approval from BOEM is required prior to any vessel transit changes.

In their 2020 BO, NMFS estimated an annual rate of 0.10 vessel strikes likely to result in no or minor injuries to sperm whales per year from oil and gas activities (USDOC, NMFS, 2020a).

By selecting Alternative 3, the operator is required to follow the conditions of approval and monitoring measures in Appendix C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols outlined above and in the NMFS 2020 BO. With these conditions of approval and monitoring measures in place, the impacts to sperm whales, Bryde's whales, and other marine mammals is determined to be **minor**.

Potential Impacts to Marine Mammals from Marine Trash and Debris

Marine debris is a serious concern in the ocean environment. Plastics, in particular, and from many different sources, pose a threat to the environment and a serious threat to marine mammals. Ingestion of plastic has the potential to cause a digestive blockage which may ultimately lead to the death of a marine mammal (Gall and Thompson, 2015). Entanglement also has the potential to result in injury or mortality for marine mammals (Gall and Thompson, 2015). By selecting Alternative 3, the operator is required to follow the

Conditions of Approval and monitoring measures in Appendix B: Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols outlined above and in the NMFS 2020 BO. With these Conditions of Approval and monitoring measures in place, the impacts to sperm whales, Bryde's whales, and other marine mammals is determined to be **negligible**.

Conclusion

In conclusion, given the scope, timing, and transitory nature of the proposed action and given the conditions of approval and monitoring measures in place, the impacts related to the proposed HRG survey is not expected to rise to the level of significance. The geographic scope of the proposed action is small in relation to the ranges of marine mammals in the GOM. 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 have a PSO monitor the exclusion zone for 30 minutes during pre-clearance. Survey activities will involve limited vessel traffic related to the towing of the HRG survey components that carries some risk of collisions; however, animals may avoid the moving vessels, reducing the likelihood of collision. BOEM has adopted applicable guidance from the NMFS 2020 BO to minimize/negate the chance of vessel strike to marine mammals: Appendix C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols. Also, BOEM has adopted applicable guidance from the NMFS 2020 BO to minimize/negate the chance of marine trash and debris impacts to marine mammals: Appendix B: Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols.

3.2.3. Cumulative Impact Analysis

Chapter 4.2 of the GOM G&G PEIS and Chapter 4.9 of the Multisale EIS and 2018 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 GOM 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 seismic 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 are expected 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 conditions of approval 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, are impossible to predict but do occur in the GOM though impacts remain difficult to quantify.

Conclusion

The effects of the proposed action, when viewed in light of the effects associated with other relevant activities, may impact marine mammals in the GOM. With the implementation of the required conditions of approval and monitoring measures for HRG survey and vessel operations under Alternative 3, as well as the limited scope, timing, and geographic location of the proposed action, effects from the proposed survey activities on marine mammals will be **negligible** (acoustic and vessel noise, trash and debris) to **minor** (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 Chapter 4.3 and Appendix E of the GOM G&G PEIS and Chapters 4.9 of the Multisale EIS and 2018 SEIS, FWS 2018 BO, and in the NMFS 2020 BO, and is incorporated by reference into this SEA. Of the extant species of sea turtles, five are known to inhabit the waters of the GOM (Pritchard, 1997): the leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), and loggerhead (*Caretta caretta*). The loggerhead turtle is the most abundant turtle in the GOM (Dodd, 1988). The leatherback turtle is the most abundant turtle in the northern GOM continental slope (Mullin and Hoggard, 2000). 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, GOM, and Caribbean Sea.

All five species of sea turtles found in the GOM have been federally listed as endangered or threatened since the 1970's. Critical habitat was designated for the distinct population segment (DPS) of Northwest Atlantic loggerhead turtles on July 10, 2014 in 79 CFR 79 39755 39854 (*Federal Register*, 2014).

In 2007, FWS and NMFS published 5-year status reviews for federally listed sea turtles in the GOM (USDOC, NMFS and USDO, FWS, 2007a-e). A 5-year review is an ESA-mandated process that is conducted to ensure that the listing classification of a species as either threatened or endangered is still accurate. Both agencies share jurisdiction for federally listed sea turtles and jointly conducted the reviews. After reviewing the best scientific and commercially available information and data, agencies determined that the current listing classification for the five sea turtle species remain unchanged. Updated 5-year reviews for hawksbill and leatherback turtles were published in 2013 that support the current listing status for these species (USDOC, NMFS and USDO, FWS, 2013a and b).

Sea Turtle Hearing

The anatomy of sea turtle ears and measurements of auditory brainstem responses of green and loggerhead sea turtles demonstrate that sea turtles are sensitive to sounds, with an effective hearing range within low frequencies (Bartol et al., 1999; Lenhardt et al., 1983; Moein et al., 1994; Ridgway et al., 1969). Although external ears are absent, sea turtles have a tympanum composed of layers of superficial tissue over a depression in the skull that forms the middle ear. The tympanum acts as additional mass loading to the ear, allowing for reduction in the sensitivity of sound frequencies and increasing low-frequency, bone-conduction sensitivity (Bartol et al., 1999; Lenhardt et al., 1985). Lenhardt et al. (1983) and Moein et al. (1993 and 1994) found that bone-conducted hearing appears to be an effective reception mechanism for sea turtles (i.e., loggerhead and Kemp's ridley) with both the skull and shell acting as receiving surfaces for water-borne sounds at frequencies of 250-1,000 Hz. By measuring AEP responses of juvenile green sea turtles to tone pip stimuli, Piniak et al. (2016) found that these turtles have a narrow range of underwater and aerial low frequency hearing. Aerial sound pressure thresholds were lower than those underwater, though they detected a larger frequency range underwater (Piniak et al., 2016). Also, sound intensity level thresholds were lower underwater (Piniak et al., 2016). There is relatively little data on sea turtle hearing, though the current understanding is that sea turtles are low frequency hearing specialists, typically hearing frequencies from 30 Hz to 2.0 kHz (or 2,000 Hz), with a range of maximum sensitivity between 100 to 800 Hz, and a narrower frequency range in air (Bartol et al., 1999; Piniak et al., 2012; Popper et al., 2014). The NMFS 2020 BO stated that sea turtles may be affected by sound exposures from airguns and boomers (USDOC, NMFS, 2020a). Unlike marine mammals, sea turtles "do not appear to greatly utilize environmental sound, at least at far distances in the open ocean" (USDOC, NMFS, 2007).

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 from the HRG survey; (2) vessel noise; (3) vessel traffic; and (4) marine trash and debris. Chapter 4.3 of the GOM

G&G PEIS contains a discussion of the potential impacts from survey operations on sea turtles (USDOJ, BOEM, 2017a). Additional information about routine impacts from oil and gas activity on sea turtles is addressed in Chapter 4.9 of the Multisale EIS and 2018 SEIS and the NMFS 2020 BO. 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 HRG 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 HRG equipment, there would be no risk of collisions with sea turtles.

3.3.2.2. Alternative 2

If Alternative 2, the Proposed Action, 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 conditions of approval and monitoring measures include, but are not limited to: 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 Additional Conditions of Approval, is selected the applicant would undertake the proposed activities, as requested and conditioned in the application; however, the applicant would be required to undertake additional conditions of approval and monitoring measures as identified by BOEM, in coordination with NMFS and in compliance with the NMFS 2020 BO consultation requirements (i.e., Appendix A: Seismic Survey Mitigation and Protected Species Observer Protocols, B: Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols, and C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols). For the reasons set forth below, inclusion of these measures under Alternative 3 limits or negates potential impacts to sea turtles (e.g., vessel strikes, behavioral disruption from vessel presence).

Potential Impacts to Sea Turtles from Active Acoustic Sound Sources

During geophysical surveys, non-impulsive sound sources are used to identify sand resources. Several electromechanical sound sources, including a 400-kHz side-scan sonar, and a 200-kHz CHIRP subbottom profiler, would operate within a frequency range that is inaudible to sea turtles within the GOM (BOEM, 2017a). The use of these active sound sources with outputs outside of the adult sea turtle hearing range of 50 to 1,200 Hz (up to 1,600 Hz for juvenile sea turtles) during the proposed activity would minimize the possibility of auditory effects (PTS and TTS) and/or behavioral disturbance. The effects to sea turtles from HRG noise are expected to be **negligible**.

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. Vessel noise from the proposed action would produce low levels of noise, generally in the 150 to 170 dB re 1 μ Pa-m at frequencies below 1,000 Hz. Vessel noise is transitory and generally does not propagate at great distances from the vessel. Also, available information indicates that sea turtles do not greatly utilize environmental sound. The NMFS 2020 BO similarly concluded that sound sources associated with vessel movement were not likely to adversely affect sea turtles (USDOC, NMFS, 2020a). The Popper et al. (2014) sound exposure guidelines were broad-ranging and provided non-quantified, generalized guidelines for shipping noise as a low risk of impairment, unless the turtle is in the near field range (within tens of meters), which would pose a moderate risk of TTS that can recover over time. The risk for noise to cause masking and behavior effects range from low to high depending on the location of the turtle relative to the noise (Popper et al., 2014). The effects to sea turtles from vessel noise are expected to be **negligible**.

Potential Impacts to Sea Turtles from Vessel Traffic

Sea turtles spend at least 3-6 percent of their time at the surface for respiration and perhaps as much as 26 percent of time at the surface for basking, feeding, orientation, and mating (Lutcavage et al., 1997). There is little data available concerning potential sea turtle impacts from accidental vessel strike due to a lack of studies and/or challenges with detecting such impacts (Nelms et al., 2016). Nonetheless, in the GOM, vessel strike from all types of vessels is known to result in sea turtle mortality and injury, with the associated response depending on the size and speed of the vessel (Lutcavage et al. 1997; Work et al., 2010; Nelms et al., 2016). Although sea turtles can move somewhat rapidly, they are still vulnerable to strikes from vessels that are moving at more than four (4) km per hour, which is common in open water (Hazel et al., 2007; Work et al., 2010). Based on the behavioral observations of turtle avoidance of small vessels, green turtles may be susceptible to vessel strikes at speeds as low as two knots (Hazel et al., 2007). Although there have been hundreds of thousands of vessel trips that have been made in support of offshore operations during the past 40 years of OCS oil and gas operations, there have been no reports of OCS-related vessels having struck sea turtles. This is most likely because a strike with a turtle would probably go undetected by larger vessels and strikes are not reported. Despite the lack of on-water reporting, stranding records show that interactions between vessels and sea turtles in the GOM are quite common (USDOC, NMFS, 2020a). Data show that collisions with all types of commercial and recreational vessel traffic are a cause of sea turtle mortality in the GOM (Lutcavage et al., 1997). Both live and dead sea turtles are often found with deep cuts and fractures indicative of collision with a boat hull or propeller (Hazel et al., 2007).

Based on sea turtle density estimates in the GOM, the encounter rates between sea turtles and vessels would be expected to be greater in water depths less than 200 m (656 ft) (USDOC, NMFS, 2007). To further minimize the potential for vessel strikes, BOEM requires operators to implement Appendix C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols, which contains vessel strike avoidance measures for sea turtles and other protected species. With implementation of these measures and a PSO on the lookout for sea turtles, the NMFS 2020 BO concluded that the risk of collisions between oil/gas-related vessels (including those for G&G, drilling, production, decommissioning, and transport) and sea turtles is appreciably reduced, but strikes may still occur. The NMFS 2020 BO then grants BOEM an Incidental Take Statement that includes a set number of allowable takes of sea turtles by vessel strikes (USDOC, NMFS, 2020a). As per the required reporting under the NMFS 2020 BO Appendix C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols, BOEM monitors for any takes that have occurred as a result of vessel strikes and also requires that any operator immediately report the striking of any animal (see requirements under Appendix C). To date, there have been no reported strikes of sea turtles by G&G survey vessels. Given the scope, timing, and transitory nature of the proposed action and with these established conditions of approval and monitoring measures, effects to sea turtles from vessel collisions is expected to be **minor**.

Potential Impacts to Sea Turtles from Marine Trash and Debris

A variety of trash and debris, which comes from land-based and ocean sources, is commonly observed in the GOM. Turtles may become entangled in drifting debris and ingest fragments of synthetic materials (Gregory, 2009; Gall and Thompson, 2015; Schuyler, 2016). Once entangled, turtles may drown, incur impairment to forage or avoid predators, sustain wounds and infections from the abrasive or cutting action of attached debris, or exhibit altered behavior that threaten their survival (Gall and Thompson, 2015). By selecting Alternative 3, the operator is required to follow the conditions of approval and monitoring measures in Appendix B: Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols outlined above and in the NMFS 2020 BO. With these conditions of approval and monitoring measures in place, the impacts to sea turtles is determined to be **negligible**.

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. As described, effects of HRG survey 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.

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

As described, effects of vessel noise on sea turtles are considered “discountable” (USDOC, NMFS, 2007 and 2020a). The risk of impacts from marine trash and debris would not rise to the level of significance given that BOEM requires compliance with Appendix B: Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols. 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 Appendix C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols, which provides guidelines on monitoring programs to 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 NMFS 2020 BO recognizes that these measures should appreciably reduce the potential for vessel strikes. The NMFS 2020 BO determined vessels strikes are likely to adversely affect sea turtles related to the proposed actions and granted a limited number of Incidental Take Authorizations to BOEM for sea turtle mortalities by vessel strikes. BOEM continues to assess activity for any strikes to ensure this authority is not exceeded. To date, there have been no reported strikes of sea turtles by G&G survey vessels.
- The scope, timing, and transitory nature of the proposed action will result in limited opportunity for sea turtles and vessel strikes.

3.3.3. Cumulative Impact Analysis

Chapter 4.3 of the GOM G&G PEIS and Chapter 4.9 of the Multisale EIS and 2018 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 EA.

Activities considered under the cumulative scenario which include the GOM 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 are expected from chance collisions with OCS service vessels, ingestion of plastic material, commercial fishing, and pathogens. Few deaths as a result of OCS structure removals may occur but would be minimal due to requisite conditions of approval 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). A condition of approval is in place to reduce vessel strike mortalities (i.e., Appendix C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols).

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 GOM and along the Gulf Coast. Generally, the impacts have been localized and infrequent; however, few areas of the Gulf Coast did not suffer some damage in 2004, 2005, and 2017. 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 injury effects from the proposed action on sea turtles are expected to be **negligible** for acoustic 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 and the requirements under the NMFS 2020 BO, such as Appendix A: Seismic Survey Mitigation and Protected Species Observer Protocols, B: Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols, and C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols.

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 GOM. With the implementation of the required conditions of approval and monitoring measures for HRG survey and vessel operations (Appendix A: Seismic Survey Mitigation and Protected Species Observer Protocols; B: Gulf of Mexico Marine Trash and Debris Awareness and Elimination Survey Protocols; and C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead Aquatic Protected Species Reporting Protocols) and the scope of the proposed action, incremental effects from the proposed HRG survey activities on sea turtles will be **negligible** (acoustic and vessel noise, trash and debris) to **minor** (vessel strikes). 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.

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 Chapter 4.4 and Appendix E of the GOM G&G PEIS and Chapter 4.7 of the Multisale EIS and 2018 SEIS, and is incorporated by reference into this SEA.

Threatened or Endangered Species

Four GOM fish species, the Gulf sturgeon, smalltooth sawfish, giant manta ray, and Nassau grouper are protected under the ESA. One species of elasmobranch, the oceanic whitetip shark is also protected under the ESA. The Gulf sturgeon (*Acipenser oxyrinchus oxyrinchus*) was listed as threatened October 30, 1991 (56 CFR §49653, September 30, 1991). Gulf sturgeon is predominantly distributed in the nearshore waters of the northeastern GOM, and currently, the smalltooth sawfish is predominantly distributed in the nearshore waters of south Florida (USDOI, FWS and Gulf States Marine Fisheries Commission, 1995; USDOC, NMFS, 2009). In their 2020 BO, NMFS determined that smalltooth sawfish and their designated critical habitat are not likely to be adversely affected by BOEM's oil and gas program (USDOC, NMFS, 2020a). The oceanic whitetip shark (*Carcharhinus longimanus*) was listed as threatened January 30, 2018 under the ESA (83 FR 4153). The EFH for the oceanic whitetip shark in the project area includes localized areas in the central GOM and Florida Keys. The giant manta ray (*Manta birostris*) was listed as threatened January 22, 2018 under the ESA (83 FR 2916). Although no EFH or critical habitat has been designated, the giant manta rays are widespread in the GOM. 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 meters) during the day (Miller and Klimovich, 2016).

Non-ESA-Listed Species

Approximately 1,540 species of fishes are recorded in the GOM 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 GOM. 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 (USDOC, NMFS, 2006). An example is the Atlantic bluefin tuna, which are known to use the GOM 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 GOM is within a designated EFH. Further, the GOM regional Fishery Management Council amended their GOM 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., 2000; McCauley et al., 2003) and behavioral response (Skalski et al., 1992; Engas et al., 1996; Slotte et al., 2004; Lokkeborg 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 from the HRG survey; (2) vessel noise; and (3) vessel traffic. Chapter 4.4 of the GOM G&G PEIS contains a discussion of the potential impacts from survey operations on fish resources (USDOI, BOEM, 2017a). Additional information about routine impacts from oil and gas activity on fish is addressed in

Chapter 4.7 of the Multisale EIS and 2018 SEIS and the NMFS 2020 BO. 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 HRG survey 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, 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 HRG survey noise), are expected to be short-term, localized and not lead to significant impacts. Although the conditions of approval 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 Additional Conditions of Approval, is selected the applicant would undertake the proposed activities, as requested and conditioned in the application; however, the applicant would be required to undertake additional conditions of approval and monitoring measures as identified by BOEM, in coordination with NMFS and in compliance with the NMFS 2020 BO consultation requirements. As described in the analyses below, impacts to fish from the proposed action (e.g., hearing loss or behavioral disruption from HRG survey noise), are expected to be short-term, localized and not lead to significant impacts. Although the conditions of approval 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. Noise produced by HRG survey activities are beyond most fishes' hearing ranges and therefore are not expected to impact fish or EFH. Any minor behavioral changes (e.g. moving away from a sound source) would affect a very small number of fish, including protected species, and is not expected to interrupt the ability of an individual to forage, rest, or migrate, or ultimately impact an animal's fitness. Electromechanical sources utilized in the proposed HRG survey are not expected to impact hearing loss, behavioral response, masking, or non-auditory effects for fish resources (BOEM, 2017a). Therefore, the impacts to fish from active acoustic sources are expected to be **negligible**.

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. According to the NMFS 2020 BO, the effects of vessel noise would be insignificant to the Gulf sturgeon (USDOC, NMFS, 2020a). Therefore, the effects to fish from vessel noise are expected to be **negligible**.

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 NMFS 2020 BO Effects Analysis for Gulf sturgeon estimated one nonlethal and 21 lethal vessel strikes would occur over 50 years as a result of vessels associated with the proposed action. The effects to giant manta rays and oceanic white tip sharks from vessel strikes are discountable (USDOC, NMFS 2020a). The operator is required to adhere with the mitigation and monitoring measures provided in the NMFS 2020 BO under Appendix C: Gulf of Mexico Vessel Strike Avoidance and Injured/Dead

Aquatic Protected Species Reporting Protocols. Compliance with the regulations as clarified in the NMFS 2020 BO should reduce or avoid impacts from vessel strikes under this alternative. With these conditions of approval and monitoring measures in place, the impacts to the Gulf sturgeon and other fish species is **negligible**.

Conclusion

Noise from the proposed action is beyond most fishes' hearing range and is not expected to impact fish or EFH. In addition, the use of HRG sound sources would be from a moving vessel and would be temporary and spatially limited. Therefore, impacts to fish resources from the proposed activity would be **negligible**.

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 Chapter 4.4 of the GOM G&G PEIS and Chapter 4.7 of the Multisale EIS and 2018 SEIS. The information from these documents is incorporated by reference in this EA.

Activities considered under the cumulative scenario include the GOM 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, and 2018 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 GOM. The proposed action is a short-term event in a portion of the GOM; therefore, the effects from the proposed action will be slight in regards 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 occurring in the GOM. However, given the scope of the proposed action, incremental effects from the proposed HRG survey activities on fish and fisheries will be **negligible**.

3.5. OTHER CONSIDERATIONS

A discussion of the other resources considered but not analyzed under this SEA is found in Chapter 5 of the GOM G&G PEIS (USDOI, BOEM, 2017a) and Chapter 3 of the Multisale EIS and 2018 SEIS (USDOI, BOEM, 2017b and c).

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 found in Chapter 6 of the GOM G&G PEIS and Chapter 5 of the Multisale EIS and 2018 SEIS (USDOI, BOEM, 2017a, b, and c).

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. On April 20, 2018, the FWS issued its 10-year programmatic BO (FWS 2018 BO) for BOEM and BSEE's oil and gas activities in the GOM. The FWS 2018 BO does not include any terms and conditions for the protection of endangered species that the Bureaus, lessees, or operators must implement. The FWS 2018 BO also noted that any future consultations may be informal, dependent upon the likelihood of take.

On March 13, 2020, NMFS issued a Programmatic BO (NMFS 2020 BO) and related terms and conditions for oil and gas activities in the GOM for the protection of these species, including holding lease sales. The NMFS 2020 BO addresses any future lease sales and any approvals issued by BOEM and BSEE, under both existing and future OCS oil and gas leases in the GOM, over a 10-year period. Applicable terms and conditions and reasonable and prudent measures from the NMFS 2020 BO will be applied at the lease sale stage; other specific conditions of approval will also be applied to post-lease approvals. The NMFS 2020 BO may be found here:

<https://www.fisheries.noaa.gov/resource/document/biological-opinion-federally-regulated-oil-and-gas-program-activities-gulf-mexico>.

The Appendices and protocols may be found here:

<https://www.fisheries.noaa.gov/resource/document/appendices-biological-opinion-federally-regulated-oil-and-gas-program-gulf-mexico>.

BOEM petitioned NMFS for rulemaking under the MMPA, to assist industry in obtaining incidental take coverage for marine mammals due to oil and gas G&G surveys in the GOM. If NMFS issues a final rule as a result of the petition, the NMFS 2020 BO may be amended and additional mitigation measures beyond what is currently within Appendix A and C may be imposed through Letters of Authorizations under the rule.

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 EIS/ROD or an EA/FONSI to comply with Section 106 of the National Historic Preservation Act in lieu of 36 CFR § 800.3-800.6.

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