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

ACTIVITY-SPECIFIC ENVIRONMENTAL ASSESSMENT

OF

GEOLOGICAL & GEOPHYSICAL SURVEY AUTHORIZATION NO. E18-005

FOR

TAYLOR ENGINEERING, INC.

April 9, 2019

RELATED ENVIRONMENTAL DOCUMENTS

Atlantic OCS Proposed Geological and Geophysical Activities: Mid-Atlantic and South Atlantic Planning Areas; Final Programmatic Environmental Impact Statement
(OCS EIS/EA BOEM 2014-001)

Section 7 Consultation Under the Endangered Species Act: Programmatic G&G Activities in the Mid-Atlantic and South Atlantic Planning Areas from 2013 to 2020; Biological Opinion
(July 2013)

Sand Survey Activities for BOEM's Marine Minerals Program Atlantic and Gulf of Mexico Draft Environmental Assessment
(June 2018)

Section 7 Consultation Under the Endangered Species Act: Sand Survey Activities for BOEM's Marine Minerals Program Atlantic and Gulf of Mexico Draft Environmental Assessment
(February 2019)

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

In accordance with the National Environmental Policy Act (NEPA), the Bureau of Ocean Energy Management (BOEM) has prepared an Activity-Specific Environmental Assessment (SEA) (No. E18-005) for geophysical activities proposed by Taylor Engineering, Inc. (Taylor) in a portion of the Atlantic Ocean. NEPA regulations issued by the Council on Environmental Quality (CEQ) (40 CFR §1500 and § 1508), the United States Department of the Interior's NEPA implementing regulations (43 CFR § 46), and BOEM's regulations require the evaluation of applications seeking authorization for geological and geophysical (G&G) activities on the Outer Continental Shelf (OCS).

The regulation at 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 and the proposed action were also examined in the following documents, which are adopted (in part and/or in full) and incorporated by reference to support the impact analysis and determination, particularly for marine mammals and sea turtles:

- Atlantic OCS Proposed Geological and Geophysical Activities: Mid-Atlantic and South Atlantic Planning Areas; Final Programmatic Environmental Impact Statement (Atlantic G&G PEIS) (BOEM, 2014);
- 2013 Section 7 Consultation Under the Endangered Species Act: Programmatic G&G Activities in the Mid- and South Atlantic Planning Areas from 2013 to 2020; Biological Opinion (2013 Atlantic G&G BO) (NMFS, 2013);
- Sand Survey Activities for BOEM's Marine Minerals Program Atlantic and Gulf of Mexico Draft Environmental Assessment (MMP EA) (BOEM, 2018); and
- 2019 Section 7 Consultation Under the Endangered Species Act: Sand Survey Activities for BOEM's Marine Minerals Program Atlantic and Gulf of Mexico Draft Environmental Assessment (2019 MMP NMFS ESA) (NMFS, 2019b).

The Atlantic G&G PEIS analyzed whether significant impacts to Atlantic resources could occur as a result of G&G activities in support of all of BOEM's programs – oil and gas, renewable energy, and marine minerals. In 2018, the MMP EA was prepared to describe and evaluate the potential environmental impacts related to G&G survey activities that support identification, delineation, monitoring, and scientific investigations of sand resources on the Atlantic and Gulf of Mexico (GOM) OCS. The MMP EA analyzed if significant impacts on Atlantic and GOM resources could occur because of proposed sand survey activities and specific mitigation measures that would be implemented to avoid, reduce, or minimize impacts.

Proposed Action

Taylor proposes to collect 26 sediment samples using vibracores in a sand borrow area for a sand compatibility study. The cores will be 3 inches in diameter and 20 feet long. The coring locations are in the same area that was recently permitted for Taylor's High Resolution Geophysical survey in E18-003. The project area is approximately 2 miles (3.2 kilometers) from the nearest shoreline near Sawgrass, Florida (the samples will be collected from state and federal waters, though this SEA is only for the action in federal waters). The water depth of the project area is between 33-65 feet (10 - 20 meters). The operation will be using one vessel, the *Artemis*, which is comparable to those described in the Atlantic G&G PEIS and MMP EA for similar operations. The proposed survey is expected to take approximately 2 months to complete once initiated. For a more detailed description of the proposed action, see **Chapter 1.3** of the SEA.

Factors Considered in This Determination

In analyzing the significance of the proposed action, BOEM considered the context and intensity of the proposed action. In doing so, the impact analysis for the proposed activity focused on the impact-producing

factors (IPF) and the resources impacted by these IPFs. The IPFs considered in the SEA include the following: (1) vibratory noise; (2) vessel disturbance (noise, traffic, and strike); (3) pollution (trash and debris and accidental fuel spills).

BOEM has assessed the potential impacts of the proposed action on the following resources:

(1) marine mammals;
(2) sea turtles;
(3) fish resources;
(4) archaeological resources; and
(5) other marine resources and space-use consideration.

The table below shows the impact determinations reached in the SEA for each of the alternatives:

Resource	Alternative 1: No Action	Alternative 2: Proposed Action as Submitted	Alternative 3: Proposed Action as Submitted with Additional Mitigation Measures	Incremental Cumulative
Marine Mammals	Negligible	Negligible to Minor	Negligible to Minor	Negligible to Minor
Sea Turtles	Negligible	Negligible to Minor	Negligible to Minor	Negligible to Minor
Fish	Negligible	Negligible	Negligible	Negligible
Archaeological Resources	Negligible	Negligible to Minor	Negligible to Minor	Negligible to Minor
Other Marine Resources	Negligible	Negligible	Negligible	Negligible

Negligible	No impact or impacts may or may not cause observable changes to natural conditions; regardless, they do not reduce the integrity of a resource.
Minor	Impacts cause observable and short-term changes to natural conditions but they do not reduce the integrity of a resource.
Moderate	Impacts cause observable and short-term changes to natural conditions and/or they reduce the integrity of a resource.
Major	Impacts cause observable and long-term changes to natural conditions and they reduce the integrity of a resource.

NOTE: The descriptions above are a general summary/definition of the overall impacts. Refer to each specific resource in Chapter 3 for a more detailed definition of the impact levels used for our evaluation of the potential impacts to resources. See **Chapter 3.6**.

As shown above, none of the impacts expected to occur under the activities considered would result in more than minor impacts to the resources evaluated.

As part of and in addition to consideration of the impact determinations above, BOEM considered that the action does not pose a threat to public health and safety, factored in and provided mitigation to address ecologically critical areas, and addressed a wealth of growing and accepted scientific information regarding species of concern. BOEM considered the uncertainties proposed by the proposal but did not find the degree of uncertainty, given extensive mitigation imposed, to be significant. The proposed activity is commonly conducted to identify sediment resources. This action is not expected to impact significant scientific, cultural, or historical resources and has been determined to have no more than minor impacts to marine mammals and listed species and their habitats, with applied mitigation. The applicant has obtained the necessary authorizations to ensure compliance with all laws applicable to resources of concern (e.g., ESA, MMPA, and CZMA).

Conclusion

Based on the above, BOEM has concluded that the proposed action, with the mitigation measures identified in the alternatives analyzed, will not have a significant impact on the marine, coastal, or human environment. Any new information relevant to the proposed action was updated and analyzed in the attached SEA and the other documents listed above that were reviewed and considered by BOEM. Therefore, an Environmental Impact Statement is not required.

PERRY BOUDREAUX

Digitally signed by PERRY BOUDREAUX
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April 9, 2019

Perry J. Boudreaux

Date

Chief, Environmental Operations Section
Office of Environment
Gulf of Mexico OCS Region
Bureau of Ocean Energy Management

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ACTIVITY-SPECIFIC ENVIRONMENTAL ASSESSMENT PREPARED FOR TAYLOR ENGINEERING, INC. GEOLOGICAL AND GEOPHYSICAL SURVEY APPLICATION NO. E18-005

1 INTRODUCTION

Taylor Engineering, Inc. (Taylor) submitted a permit application to collect sediment samples via vibracoring on the Outer Continental Shelf (OCS) of the Atlantic Ocean. This Activity-Specific Environmental Assessment (SEA) evaluates the specific impacts associated with Taylor's proposed geological and geophysical (G&G) survey activities.

The regulation at 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 and the proposed action were also examined in the following document, and the analyses therein are adopted (in part and/or in full) and incorporated by reference to support the impact analysis and determination in this SEA, particularly for marine mammals and sea turtles:

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The Atlantic G&G PEIS analyzed whether significant impacts to Atlantic resources could occur as a result of G&G activities in support of all of BOEM's program areas, i.e., oil and gas, renewable energy, and marine minerals. In 2018, the MMP EA was prepared to describe and evaluate the potential environmental impacts related to G&G survey activities that support identification, delineation, monitoring, and scientific investigations of sand resources on the Atlantic and Gulf of Mexico (GOM) OCS. The MMP EA analyzed if significant impacts on Atlantic and GOM resources could occur as a result of proposed sand survey activities and specific mitigation measures that would be implemented to avoid, reduce, or minimize impacts.

To support the decision-making process, BOEM's activity-specific NEPA analysis was conducted using scientific approaches (i.e., qualitative and quantitative), the use of best available science, and subject-matter expert understanding and reasoning. While quantitative analysis can provide numerical estimates of the potential effects or impacts, qualitative analysis can allow for critical reasoning in determining the links between factors (i.e., species behavior, habitat needs, and hearing ranges) with the proposed action to allow for a comprehensive evaluation of potential direct and indirect effects, and cumulative impacts.

1.1 BACKGROUND

The Outer Continental Shelf Lands Act of 1953 (OCSLA), as amended (43 U.S.C. §§ 1331 *et seq.*), hereafter referred to as OCSLA, establishes the Nation's policy for managing the energy and mineral resources of the OCS. BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) 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.

BOEM and BSEE regulate leasing, exploration, development, production, and decommissioning; they also perform environmental analyses during each of these phases. One purpose of BOEM's regulatory program is to ensure that the G&G data are obtained in an environmentally safe manner. BOEM's Resource Evaluation Program oversees G&G data acquisition and permitting activities pursuant to 30 CFR § 551 and § 580. Specifically, Section 11 of OCSLA, as amended, regulates G&G exploration of marine minerals.

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

The activities proposed in Taylor's G&G permit application (No. E18-005) will provide information to determine if the sand in the proposed borrow area is compatible with existing beach sand and could be used for future beach restoration projects in St. Johns County, Florida.

The type and scope of the effects on Atlantic resources from activities similar to those proposed in Taylor's G&G survey application (No. E18-005) were fully discussed and analyzed in the Atlantic G&G PEIS and MMP EA. The Atlantic G&G PEIS and MMP EA are high-level overviews of potential impacts to coastal, marine, and human resources from G&G activities. This SEA was prepared by BOEM to evaluate the applicant's proposed G&G activities with activity-specific information and any new information available since publication of the Atlantic G&G PEIS and MMP EA to ensure that the analysis is sufficiently comprehensive and adequate to support decision-making for authorization of the proposed action.

The proposed action is for a BOEM decision on whether to approve, approve with conditions, or deny a permit for G&G survey activities.

1.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

This survey proposes to collect sediment samples via vibracoring in a sand borrow area. The proposed action is needed to identify additional OCS sand resources for beach nourishment and coastal restoration projects. This project will facilitate access to OCS sand resources that are needed for beach nourishment and coastal restoration in St. Johns County, Florida. Sand resources in state and OCS waters can supply high-quality sand needed for beach nourishment and shoreline restoration projects along this stretch of the South-Atlantic coastline.

1.3 PROPOSED ACTION

Taylor proposes to collect 26 sediment samples using vibracores in a sand borrow area for a sand compatibility study. The cores will be 3 inches in diameter and 20 feet long. The coring locations are in the same area that was recently permitted for Taylor's High Resolution Geophysical survey in E18-003.

The project area is approximately 2 miles (mi) (3.2 kilometers [km]) from the nearest shoreline near Sawgrass, Florida (the samples will be collected from state and federal waters, though this SEA is only for the action in federal waters). The water depth of the project area is between 33-65 feet (ft) (10 - 20 meters [m]). The operation will be using one vessel, the *Artemis*, which is comparable to those described in the Atlantic G&G PEIS and MMP EA for similar operations. The proposed survey is expected to take approximately 2 months to complete once initiated (Taylor, 2018).

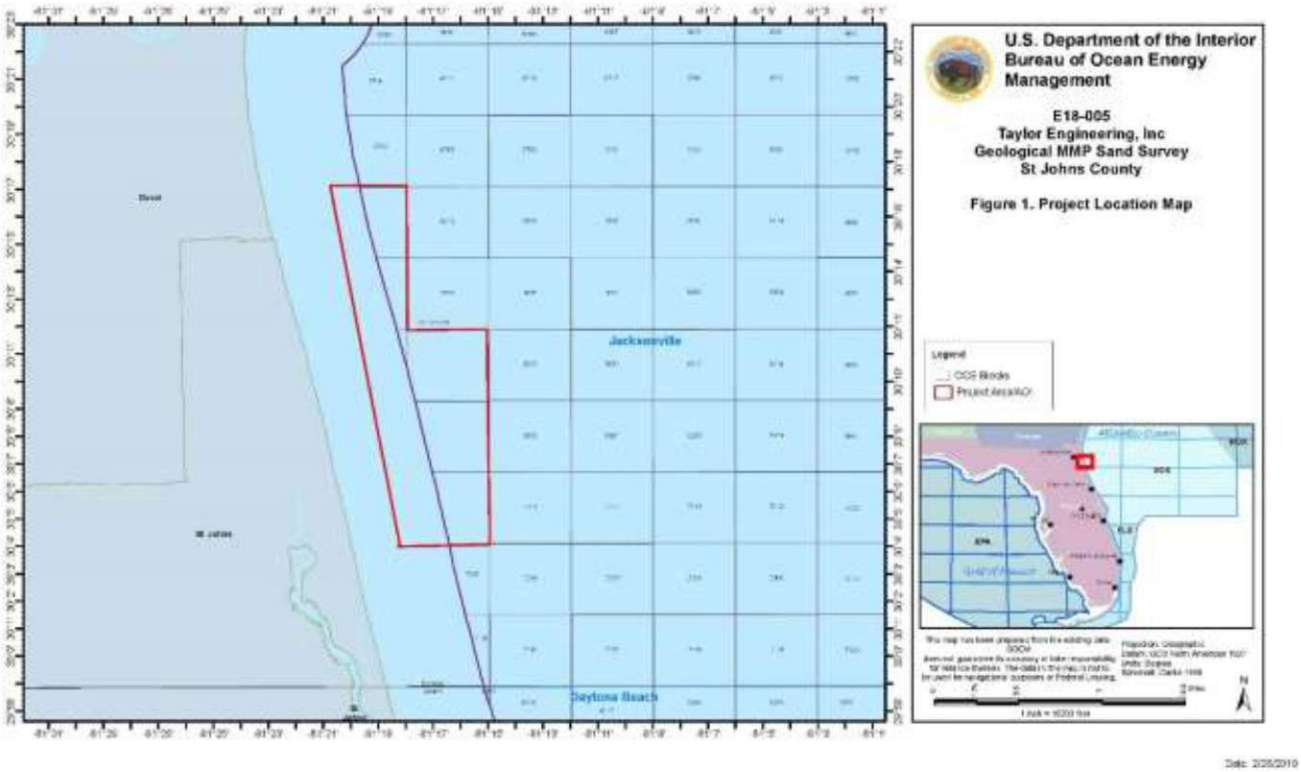

Figure 1. Proposed Action Location Map.

2 ALTERNATIVES CONSIDERED

2.1 ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Alternative 1 – If this alternative is selected, the applicant will not undertake the proposed survey activity. This alternative might prevent the exploration and the subsequent nourishment of beaches, resulting in the potential continued beach erosion, loss of beach habitat, loss of infrastructure (i.e., roads, homes, utilities), and loss of the revenue created by people engaged in beach-centric activities for the State of Florida.

2.2 ALTERNATIVE 2 – PROPOSED ACTION AS SUBMITTED

Alternative 2 – Proposed Action as Submitted. If this alternative is selected, BOEM would issue the permit on the activity as proposed by the applicant. The applicant would undertake the proposed activity as requested in the application, without any mitigation measures.

2.3 ALTERNATIVE 3 – PROPOSED ACTION AS SUBMITTED WITH ADDITIONAL MITIGATION MEASURES

Alternative 3 – This is BOEM's *Preferred Alternative.* If this alternative is selected, the applicant will undertake the proposed survey, as requested in the application, but with additional mitigation and monitoring measures identified by BOEM (listed below in **Chapter 2.4** and detailed in **Appendix A**) to fully address the activity-specific impacts of the proposed project.

2.4 COMPARISON OF ALTERNATIVES

If Alternative 1, the No Action Alternative, is selected, BOEM would deny the permit and the applicant would not undertake the survey. The information would not be available to evaluate the sand borrow area for potential beach nourishment. Under Alternative 1, BOEM would not issue the G&G permit authorization and there would be no immediate impacts (negligible to minor) to the environmental resources analyzed in **Chapter 3**; however, this alternative does not meet the underlying purpose and need.

If Alternative 2 is selected, BOEM would approve the permit and would allow for the collection of samples as requested in the application. Alternative 2 meets the underlying purpose of and need for the proposed action but it would not include mitigation measures to prevent or reduce disturbance to marine mammals, sea turtles, fish, and archaeological resources as contemplated in Alternative 3.

Alternative 3 is BOEM's Preferred Alternative based on the analyses of potential impacts to resources described in **Chapter 3** because it meets the underlying purpose and need, and also implements the mitigation and monitoring requirements that adequately limit or negate potential impacts to resources. The proposed G&G activities will help provide Taylor with information to determine the sand compatibility of sand borrow area.

Mitigation Measures Required under the Preferred Alternative

The need for and utility of the following mitigation measures are discussed in the relevant impact analysis chapters of this SEA. The following mitigation measures and reporting requirements were identified to ensure adequate environmental protection and post-activity compliance and are detailed in **Appendix A**:

1. Vibracore Sampling Protocol
2. Vessel Strike Avoidance Protocol
3. Marine Mammal Protection Act Coordination
4. Sea Turtle and Smalltooth Sawfish Conditions
5. Marine Pollution Control Plan
6. Marine Debris Awareness Program
7. Navigation and Commercial Fisheries Operations Conflict Minimization Requirements
8. Advance Notification of Survey Activities in Military Warning and Test Areas and NASA Operating Areas
9. Historic and Pre-Contact Sites Avoidance and Reporting Requirements

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

3.1 INTRODUCTION

The discussion below (1) describes the pertinent potentially affected resources and (2) determines whether the proposed G&G activities and their impact-producing factors (IPF) could have significant impacts on the marine, coastal, or human environments of the Atlantic OCS. The description of the affected environment and impact analysis are presented together in this chapter for each resource.

For each potentially affected resource, BOEM's subject-matter experts reviewed and analyzed 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 Taylor's proposed survey activities will significantly impact the marine, coastal, or human environments of the Atlantic OCS. Preliminary screening for this assessment was based on a review of relevant literature and the analyses provided in the Atlantic G&G PEIS and MMP EA (BOEM, 2014 and 2018). BOEM considered the following resources for impact analysis, which were included in the Atlantic G&G PEIS and MMP EA:

- benthic communities;
- marine mammals (including ESA listed and non-listed species);
- sea turtles (all are ESA-listed species);
- marine and coastal birds (including ESA-listed species);
- fisheries resources and essential fish habitat (including ESA-listed species);
- commercial fishing;
- recreational fishing;
- recreational resources;
- archaeological resources;
- marine protected areas;
- other marine uses (including military and shipping and transportation);
- human resources and land use;
- air quality;
- water quality;
- phytoplankton and zooplankton;
- aesthetics; and
- environmental justice.

The resources below are scoped out of this SEA on the basis of the impact conclusions reached from new available information, the proposed action's potential impacts, and/or the Atlantic G&G PEIS and MMP

EA (all of which were negligible for activities of the type proposed by Taylor), lack of public concern, and/or the proposed action not having an impact on the resource. These resources include the following:

- benthic communities;
- marine and coastal birds (including ESA-listed species);
- recreational resources; and
- human resources and land use.

The Atlantic G&G PEIS identified air and water quality as having no expected impacts from G&G activities. These resources were also scoped out from this analysis after determining there was no new information that warranted analysis at this stage. These additional resources were scoped out in the MMP EA, per the following:

- **Phytoplankton and Zooplankton:** Primary and secondary production supports higher trophic levels, including forage fishes, large fishes, seabirds, sea turtles, and marine mammals. Impacts on phytoplankton and zooplankton would be minimal and limited to the area immediately around sound sources or if water quality conditions were to become impaired.
- **Aesthetics:** The presence of intermediate-size survey vessels (typically 50-150 ft [15-46 m] in length) is not unusual offshore the Atlantic seaboards. Sand survey vessels would be far enough offshore, with some beyond the visibility of the shoreline, and operations are spread over a relatively large inner shelf area for a limited time, which would minimize visual impacts at any specific location. Also, survey operations occur more during daylight hours so lighting during nighttime operations would be minimized.
- **Environmental Justice:** The proposed activities are not expected to result in disproportionate impacts on minority or low-income populations because effects on the coastal environment, especially in the vicinity of ports and coastal inlets, would be very limited, short-term, and far enough offshore and disbursed over a large geographic area.

BOEM evaluated the potential activity-specific impacts from the applicant's proposed G&G activities on the following resources and determined three IPFs that could result from the proposed action: (1) vibratory noise; (2) vessel disturbance (noise, traffic, and strike); (3) pollution (trash and debris and accidental fuel spills). **Table 1** summarizes the potential impacts on the following resources that were analyzed:

- marine mammals (including ESA listed and non-listed species);
- sea turtles (all are ESA-listed species);
- fish resources (all are ESA-listed species); and
- other marine and space uses (i.e., military, NASA, commercial and recreational fisheries, marine shipping and transportation, and marine protected areas).

Table 1. Summary of the IPFs Associated with the Proposed Action and Resource Impact Significance from the Atlantic G&G PEIS and MMP EA

Resource	Potential Impact Producing Factor (IPF)					
	No Impact to Negligible	Vibratory Noise	Vessel Strike	Vessel Disturbance/ (Traffic and Noise)	Pollution (Trash and Debris and Accidental Fuel Spill)	Seafloor Disturbance
Benthic Communities	X					
Marine Mammals		X	X	X	X	
Sea Turtles		X	X	X	X	
Marine and Coastal Birds	X					
Fish and EFH		X		X	X*	X
Military				X		
Shipping/ Transportation				X		
Commercial and Recreational Fisheries				X		
Marine Protected Areas	X					
Archaeological					X	X
Recreational Resources	X					
Human and Land Use	X					

*Accidental fuel spills only

3.1.1 Incomplete and Unavailable Information

BOEM used the best available scientific information to prepare this SEA. The analyses conducted are based on scientifically credible information that was publicly available at the time this SEA was prepared. Where information was incomplete or unavailable, this is disclosed and extrapolations from existing or new information employing accepted methodologies were used to make reasoned estimates and conclusions regarding both current resource baseline conditions and expected impacts from the activities considered under the alternatives. The subject-matter experts who prepared this SEA conducted a diligent search for pertinent information, and BOEM's evaluations of impacts are based upon scientifically accepted approaches or methods. The analyses for this SEA did not suffer from the existence of the incomplete or unavailable information; none of the incomplete or unavailable information would be essential to a decisionmaker when reaching a decision on whether to approve, approve with conditions, or disapprove Taylor's G&G permit application under any of the action alternatives. For these reasons, BOEM has met its NEPA obligations in this SEA: to consider the best available science and information relevant to the proposed action, alternatives, and impact analyses; and to consider to what extent incomplete or unavailable information impedes that analyses and whether issuing a Finding of No Significant Impact (FONSI) is appropriate in light of the incomplete and unavailable information (50 CFR § 1502.22).

3.2 MARINE MAMMALS

3.2.1 Description

A general description of marine mammals and their impacts is located in Chapter 4.2 of the Atlantic G&G PEIS (BOEM, 2014). There are 34 species (with 39 managed stocks) of marine mammals that are considered to occur in the area of proposed activity in the western Atlantic Ocean. These mammals are represented by members of the taxonomic order Cetacea, which is divided into the suborders Mysticeti (i.e., baleen whales) and Odontoceti (i.e., toothed whales) as well as the order Sirenia, which includes the manatee.

Threatened or Endangered Marine Mammal Species

Six marine mammal species that are likely to occur in the Atlantic OCS are federally listed as threatened or endangered species. These include four baleen whales (NARW, blue whale, fin whale, and sei whale) and one toothed whale (sperm whale) (Hayes et al., 2018; Waring et al., 2010). It also includes the West Indian Manatee (*Trichechus manatus*). Detailed information on these species, including critical habitat, can be found in the Atlantic G&G PEIS (BOEM, 2014). Due to concerns for the current status of the NARW, this species is discussed in greater detail below in relation to the proposed action.

The blue whale is considered by NMFS as an occasional visitor in the U.S. Atlantic Exclusive Economic Zone waters, which may represent the current southern limit of its feeding range (Waring et al., 2010). The blue whale's range extends from the Arctic to Cape Cod, Massachusetts, in the western North Atlantic Ocean, although it is frequently sighted off eastern Canada and has been identified as far south as Bermuda. Existing evidence indicates that blue whales do not have a specific breeding or calving area. In general, the blue whale's range and seasonal distribution is governed by the availability of prey (NMFS, 1998).

The fin whale is the second largest species of whale (NMFS, 2010). The fin whale is found primarily within temperate and polar latitudes. Seasonal migration patterns within its range remain undetermined. Like the blue whale, they have also been identified as far south as Bermuda. The fin whale was the most common whale sighted in the Atlantic waters from Cape Hatteras, North Carolina to Nova Scotia, Canada, during seismic surveys conducted from 1978 through 1982 (NMFS, 2010; Hayes et al., 2018).

The sei whale is the third largest whale and is similar in appearance to the fin and Bryde's whales. They are a cosmopolitan and highly migratory species that is found from temperate to subpolar regions. They are often found near the continental shelf edge region (Hayes et al., 2017). This general offshore pattern of sei whale distribution is disrupted during episodic incursions into more shallow and inshore waters.

The sperm whale is the largest toothed cetacean. Their distribution is from the tropical latitudes to pack ice edges in both hemispheres (Jefferson et al., 2008). In the winter, these whales concentrate east and northeast of Cape Hatteras, North Carolina. In the spring, they move northward to waters east of Delaware and Virginia, and in summer, their distribution includes continental slope and shelf waters as far as southern New England. In the fall, sperm whale occurrence on the continental shelf and shelf edge is highest in the Mid-Atlantic Bight.

The Florida subspecies (*T. m. latirostris*) of the West Indian manatee is the only sirenian that occurs along the eastern coast of the U.S. At the present time it is listed as endangered under the ESA, a "strategic stock" under the Marine Mammal Protection Act (MMPA), and vulnerable under the International Union for Conservation of Nature. Manatees are herbivorous, feeding on a wide array of aquatic plants. They prefer shallow seagrass beds, especially areas with access to deep channels. Manatees often use secluded canals, creeks, embayments, and lagoons, particularly near the mouths of coastal rivers and sloughs, for feeding, resting, mating, and calving (FWS, 2001 and 2007).

As described below, critical habitat has been designated for the NARW; none of the other ESA-listed marine mammals have critical habitat designated in the proposed survey area.

North Atlantic Right Whale (*Eubalaena glacialis*)

The NARW is the only member of the family Balaenidae found in North Atlantic waters. It is medium in size when compared with other baleen whale species, with adult size ranging from 14 to 17 m (45 to 55 ft) (NMFS, 2005). Females are larger than males. Right whales may be distinguished from other baleen whale species by their black color and stocky body; large head size with a strongly bowed lower jaw; thickened, light-colored patches of epidermis called callosities; the absence of a dorsal fin; and short, broad, paddle-

shaped flippers (Jefferson et al., 2008). The typical reproductive cycle in mature female right whales is 3 years between births. The age at sexual maturity is estimated at 9 or 10 years, and gestation length is about 12 months; calves nurse for almost 12 months.

The NARWs are usually observed in groups of less than 12 individuals, and most often as single individuals or pairs. Larger groups may be observed in feeding or breeding areas (Jefferson et al., 2008). Right whales feed on zooplankton (e.g., copepods, euphausiids [krill], and cyprids) generally by skimming through concentrated patches of prey at or below the sea surface. Grouping of individual right whales within their congregation areas is likely to be a function of acceptable prey distribution, since right whales must locate and exploit extremely dense patches of zooplankton to feed efficiently (Mayo and Marx, 1990). These dense zooplankton patches are likely a primary characteristic of the spring, summer, and fall right whale habitats (Kenney et al., 1986 and 1995).

The NARW is usually found within waters of the western North Atlantic between 20° and 60° N. latitude. The NARWs undergo seasonal coastal migrations from summer feeding grounds off eastern Canada and the U.S. northeast coast to winter calving grounds off the U.S. southeast coast. The winter calving grounds and a segment of the migratory corridor are located within the AOI. Most calving takes place in shallow coastal waters offshore Georgia and Florida between December and March (NMFS, 2005). Some mother-calf pairs may use the area from Cape Fear, North Carolina, to South Carolina as a wintering/calving area as well (NMFS, 2017b). Although the main feeding grounds are located offshore Canada and the northeastern U.S., right whales may also feed, at least opportunistically, while migrating. Waters offshore the Mid-Atlantic States have not been considered "high use" areas for the NARW, yet the whales move through these waters regularly. The seasonal movements of the NARW among congregation areas and within the AOI are not fully understood. Data suggest that not all reproductively active females return to calving and nursery grounds each year, and additional wintering and summering grounds may exist in unsurveyed locations of the western North Atlantic (Davis et al., 2017; Hayes et al., 2018).

Recent sightings data also show that a few NARWs range as far as Newfoundland, the Labrador Basin, and southeast of Greenland (Hayes et al., 2018). Research results suggest the existence of six major congregation areas for NARWs: the coastal waters of the southeastern U.S.; the Great South Channel; Georges Bank/Gulf of Maine; Cape Cod and Massachusetts Bays; the Bay of Fundy; and the Scotian Shelf (Hayes et al., 2018). Movements of individuals within and between these congregation areas are extensive, and data show distant excursions, including into deep water off the continental shelf (Mate et al., 1997; Baumgartner and Mate, 2005; Pace et al., 2017).

There are no direct hearing range data on the NARW; however, they are considered to fall within the low-frequency cetacean functional hearing group (Southall et al., 2007). Based on anatomical modeling, their hearing range is predicted to be 10 hertz (Hz) to 22 kilohertz (kHz), with a functional range most likely between 15 Hz and 18 kHz (Parks et al., 2007).

Threats to the NARW population within the AOI include commercial fishing interactions, vessel strikes, underwater noise, habitat degradation, and predators (NMFS, 2005; Hayes et al., 2018). Ship collisions and fishing gear entanglements are the most common anthropogenic causes of mortality in western NARWs, judging from observations of stranded animals (NMFS, 2005 or NMFS, 2017b). Entanglement-related deaths have accounted for 85 percent of diagnosed mortalities since 2010 (Kraus et al., 2016). Of 45 confirmed deaths of western NARWs between 1970 and 1999, 16 are known to have been caused by vessel strikes, and two additional collisions were judged as possibly fatal (Knowlton and Kraus, 2001). There were two known vessel strike right whale deaths in 2001, one in 2002, one in 2003, and two in 2004 (NMFS, 2005). Records from 2011 through 2015 have been summarized and, for this timeframe, the average reported mortality and serious injury to right whales due to vessel strikes was 0.81 whales per year (Hayes et al., 2018). In 2016, two mortalities in and around Cape Cod and at least four mortalities in the

Gulf of St. Lawrence, Canada, resulted from vessel strikes. In 2017, 17 NARW mortalities were documented, representing about 3 percent of the population. This spike in mortality events coincides with a 40 percent decline in reproductive output since 2010 (Kraus et al., 2016; Pettis et al., 2017; and refer to the NARW Unusual Mortality Event [UME] discussion below). Public media has reported that seven calves have been observed during the 2018-2019 calving season; however, this has not been confirmed by documented sources.

The NARW is considered one of the most critically endangered whales (Jefferson et al., 2008). It is listed as endangered under the ESA, and the western Atlantic stock is classified as strategic because the average annual human-related mortality and serious injury exceeds the Potential Biological Removal level (Hayes et al., 2018). The total level of human-caused mortality and serious injury is unknown, but reported human-caused mortality and serious injury was a minimum of 5.36 right whales per year from 2011 through 2015. The recent population estimate number is 458 individuals (Hayes et al., 2018).

Critical Habitat of NARW

On January 27, 2016, NMFS expanded the designated critical habitat areas for NARW (*Federal Register*, 2016). The new areas contain approximately 29,945 nmi^2 (39,656 mi^2; 102,708 km^2) of marine habitat in the Gulf of Maine and Georges Bank region and off the Southeast U.S. coast. Only the Southeast critical habitat (U.S. coast from Cape Fear, North Carolina, to below Cape Canaveral, Florida) is within the proposed activity area (**Figure 2**).

NARW Unusual Mortality Event

Under the MMPA, a UME is defined as "a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response." Since June 7, 2017, elevated NARW mortalities have occurred primarily in Canada – a total of 20 confirmed dead stranded whales have been reported (12 in Canada and 8 in the U.S.) (NMFS, 2018d). Full necropsy examinations have been conducted on 13 of the 20 and final results are pending (Fisheries and Oceans Canada, 2018; NMFS, 2018d). Necropsies found trauma and entanglement coinciding with a high level of fisheries and maritime traffic in the Gulf of St. Lawrence and found no evidence to support biotoxins, infectious diseases, or starvation as the primary causes of mortality (NMFS, 2018d). Necropsy results are pending in the U.S.

New Information Available Since Publication of the Atlantic G&G PEIS

Various printed and Internet sources (including publications from Federal agencies and journal articles) were examined to assess recent information regarding marine mammals that may be pertinent to a proposed action. New information specific to the blue whale, fin whale, sei whale, and sperm whale that could add to the analyses in the Atlantic G&G PEIS was not discovered. New information specific to the NARW that could add to the analysis was discovered and is discussed below.

The NARW is a species of concern as its population has recently shown trends of decline (Pace et al., 2017; Kraus et al., 2016), including an ongoing UME, which is described above. The primary causes of mortality are vessel strikes and entanglements (Rolland et al., 2016; Knowlton et al., 2012; Knowlton and Kraus, 2001). In the greater Atlantic, it is estimated that 2,960 marine mammals are taken each year as bycatch (NMFS, 2016), and almost 82 percent of the population of NARW studied had been entangled at least once (Knowlton et al., 2012). A recent study tracked the location of NARWs over a 10-year period and found that their distribution is broader than previously considered, as well as that they tend to be present along the entire eastern seaboard for most of the year (Davis et al., 2017). In 2017, there was a documented UME declared that may have resulted in a 3 percent population loss (Pettis et al., 2017). A rise in global temperatures may be causing a shift in NARW distribution due to prey availability (Meyer-Gutbrod et al.,

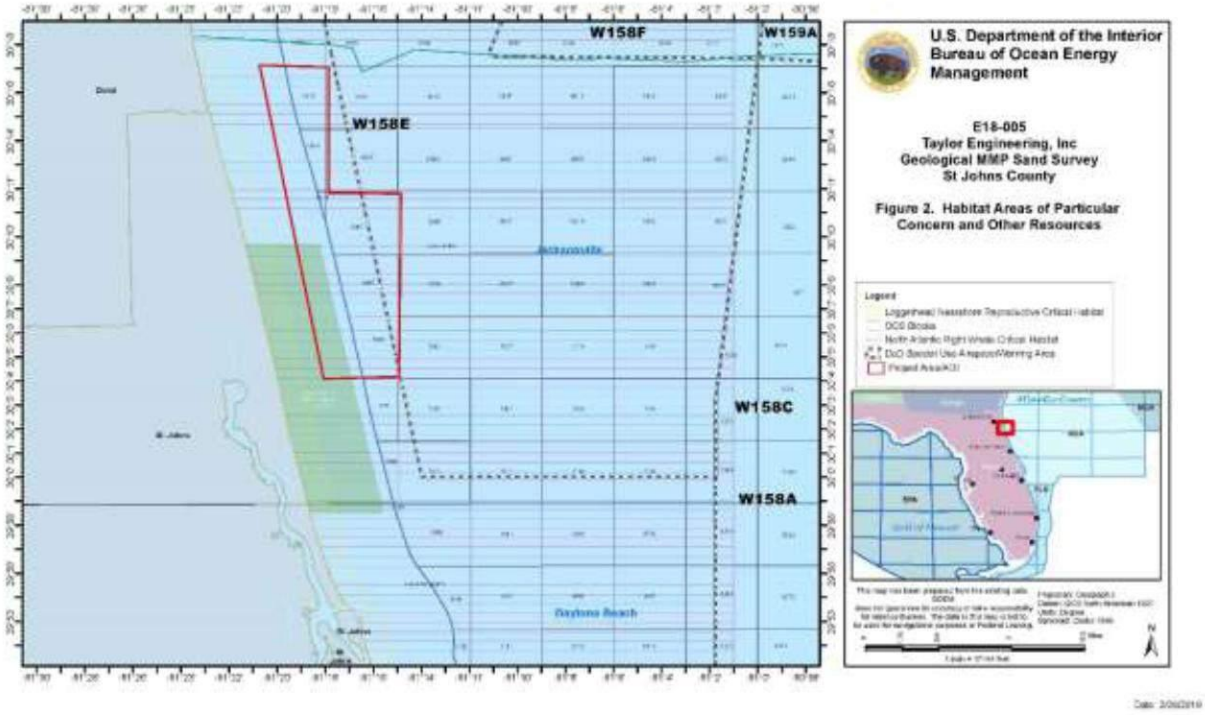

Figure 2. Habitat Areas of Particular Concern and Other Resources.

2018), and this shift is moving at least part of their range north of the Area of Interest (AOI) for the proposed action.

Non-ESA-Listed Marine Mammal Species

There are 29 marine mammal species that may occur in the area of proposed activity in the western Atlantic OCS waters that are protected under the MMPA but are not classified as endangered or threatened under the ESA. These marine mammal species consist of 3 mysticete (baleen) whales and 26 odontocete (toothed) whales and dolphins. Further information, which is incorporated by reference, can be found in the Atlantic G&G PEIS (BOEM, 2014).

Other Marine Mammal Unusual Mortality Events

Since publication of the Atlantic G&G PEIS in March 2014, there have been three active UMEs of undetermined causes including the Atlantic humpback whales, NARWs (described above), and Atlantic minke whales (i.e., UME Nos. 63, 64, and 65, respectively[1]). Necropsy results have not been consistent; thus, additional research is needed.

Since January 2016, elevated humpback whale mortalities have occurred along the Atlantic Coast from Maine through Florida. Partial or full necropsy examinations were conducted on approximately half of the whales. Of the whales examined, about 50 percent had evidence of human interaction, either ship strike or entanglement. A portion of the whales have shown evidence of pre-mortem vessel strike; however, this finding is not consistent across all whales examined and, therefore, more research is needed (NOAA, 2018a).

[1] https://www.fisheries.noaa.gov/national/marine-life-distress/active-and-closed-unusual-mortality-events

As previously stated, in 2017, there was a documented UME for NARWs that may have resulted in a 3 percent population loss (Pettis et al., 2017). The UME is ongoing and there have been 20 confirmed mortalities to date. See above for additional information on the UME for the NARW.

Since January 2017, elevated minke whale (*Balaenoptera acutorostrata*) mortalities have occurred along the Atlantic Coast from Maine through South Carolina. Full or partial necropsy examinations were conducted on over 60 percent of the whales. Preliminary findings in several of the whales have shown evidence of human interactions or infectious disease. These findings are not consistent across all of the whales examined; therefore, more research is needed (NOAA, 2018b).

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 below and are summarized in **Table 2**. The Atlantic G&G PEIS and MMP EA contain a discussion of the potential impacts from survey operations on marine mammals (BOEM, 2014 and BOEM, 2018). The three IPFs identified for marine mammals are

- vibratory noise;
- vessel disturbance (noise, traffic, and strike); and
- pollution (e.g., trash and debris, and accidental fuel spills).

For this SEA, impacts were evaluated and assigned levels of environmental impact caused by IPFs as follows, with categories tailored as needed to fit characteristics of differing IPFs.

- **Negligible:** Negligible impacts to marine mammals would include those where little to no measurable impacts are observed or expected. No mortality or serious injury (i.e., life threatening or debilitating injury) to any individual marine mammal would occur, and no disruption of behavioral patterns would be expected.
- **Minor:** Minor impacts to marine mammals would include those that are detectable but are neither extensive nor severe. Minor impacts to marine mammals would include minor auditory discomfort, temporary disruption of communication and/or echolocation from auditory masking, behavior disruptions of individual or localized groups of marine mammals, and limited, localized, and short-term displacement of individuals of any species, including strategic stocks, from the area of impact.
- **Moderate:** Moderate impacts to marine mammals would be detectable and extensive but not severe. Moderate impacts to marine mammals would include injury or mortality but in low enough numbers such that the continued viability of the local population or stock is not threatened and the annual rates of recruitment or survival of the local population or stock are not seriously affected. Moderate impacts would also include temporary displacement of individuals from preferred or critical habitats. Under the moderate impact category, the viability or continued existence of marine mammal population(s) or stock(s) affected would not be threatened, although some of the impacts to individual mammals or local groups of mammals may be irreversible.
- **Major:** Major impacts to marine mammals would be detectable, extensive, and severe. Major impacts to marine mammals would include extensive levels of life-threatening or debilitating injury or mortality in sufficiently high numbers that the continued viability of the population is seriously threatened, including serious diminishment of annual rates of recruitment or survival. Major impacts would also include the long-term disruption of behavioral patterns that would adversely affect a listed or non-listed species or stock

through its effects on annual rates of recruitment or survival, as well as permanent or long-term displacement of individuals from either preferred or critical habitat.

Table 2. Summary Level of Impacts for Marine Mammals

Impact Topics	Alternative 1: No Action	Alternative 2: Proposed Action as Submitted	Alternative 3: Proposed Action as Submitted With Additional Mitigation Measures
Vibratory Noise	Negligible	Negligible to Minor	Negligible to Minor
Vessel Disturbance	Negligible	Negligible	Negligible
Pollution	Negligible	Negligible	Negligible
Incremental Cumulative*	Negligible	Negligible to Minor	Negligible to Minor

NOTE: BOEM expects impacts to marine mammal resources to be negligible to minor, as defined under the MMPA and no more than minor as defined by BOEM for this SEA. The impact analysis and reasoning is discussed below.
*Cumulative is discussed in **Chapter 3.7**.

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 from the proposed action (discussed in **Chapter 3.2.2.3**) would not occur. Selecting this alternative would result in the avoidance of negligible to minor impacts to marine mammals from vibracoring and cumulative impacts. This alternative would also avoid negligible impacts from vessel disturbance and pollution associated with the planned survey activities.

3.2.2.2 Alternative 2

If Alternative 2, the Proposed Action as Submitted, is selected, the applicant would undertake the proposed activity as requested in the application. Potential impacts to marine mammals could include, but are not limited to, injury from vessel strikes and disruption of behaviors (e.g., feeding) from vibratory noise and vessel presence.

3.2.2.3 Alternative 3

If Alternative 3 is selected, the Proposed Action as Submitted with Additional Mitigation Measures, it would allow the applicant to undertake the proposed activities. For the reasons set forth below, inclusion of the mitigation measures under Alternative 3 limits or avoids potential impacts to marine mammals (e.g., injury from vessel noise/strikes). The applicant is required to have PSOs on board to watch for whales to minimize vessel strike and disturbance and is also required to have a marine trash and debris awareness program.

Vibratory Noise

A complete description of the potential impacts of sound sources to marine mammals is located in the Atlantic G&G PEIS (BOEM, 2014) and MMP EA. Most marine mammal species that are likely to occur within the survey area are within the low- or mid-frequency hearing category. The proposed equipment may create some broadband (typically non-impulsive) noise, with source levels much less than 180-190 dB (Reiser et al., 2011).

Based on the detailed analysis of acoustic impacts in Chapter 4.2 of the 2014 Atlantic G&G PEIS (BOEM, 2014), Chapter 3 of the MMP EA (BOEM, 2018), and the specific analysis of Taylor's proposed action above, impacts to marine mammals from vibracoring are expected to be moderate if no mitigation measures

were implemented. Adherence to the mitigation and monitoring measures described in **Appendix A** of this SEA is required for the specified permitting activities and is expected to further reduce potential impacts to marine mammals because these mitigations would decrease the risk of marine mammals entering the project area. Impacts to marine mammals are expected to be **negligible** to **minor** as in temporary behavior change and no mortality expected.

Vessel Disturbance (Noise, Traffic, and Strike)

The survey vessels create two types of disturbance that could potentially affect marine mammals: noise and ship strike. Taylor proposes to use one vessel, the *Artemis*, for their survey. Vessel and equipment noise is transitory and generally does not propagate at great distances from the vessel.

The effects of such vessel and equipment noise on marine mammals are difficult to assess because of the wide array of behavioral responses that have been observed, both between and within species. It is conservative to assume that vessel noise may, in some cases, elicit behavioral changes in individual marine mammals that are in close proximity to these vessels. These behavioral changes may include evasive maneuvers such as diving or changes in swimming direction and/or speed. 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). For example, species of small toothed cetaceans have been observed to avoid boats when they are approached to within 0.5-1.5 km (0.3-0.9 mi), with occasional reports of avoidance at greater distances (Richardson et al., 1995).

Aside from vessel noise, surveys may put marine mammals at risk of vessel strike. Many marine mammal species are vulnerable to collisions with moving vessels (vessel strikes), which can result in death, serious injury, and/or minor, non-lethal injury (Laist et al., 2001; Douglas et al., 2008; Pace, 2011). Most reports of collisions involve large whales, but collisions with smaller species also occur (van Waerebeek et al., 2007). Laist et al. (2001) provides records of the following vessel types associated with collisions with whales (listed in descending order): tanker/cargo vessels; whale watch vessels; passenger liners; ferries; naval vessels; recreational vessels; U.S. Coast Guard (USCG) vessels; fishing vessels; research vessels; dredges; and pilot boats. Most severe and lethal whale injuries involved large ships of lengths greater than 80 m (262 ft). Taylor will be using the *Artemis* vessel, which is a 35 ft vessel. Vessel speed was also found to be a significant factor, with most (89 percent) of the records involving vessels moving at 26 km/hr (16 mph; 14 kn) or greater. There are reports of collisions between moving vessels and most of the listed species that occur within the study area, particularly the fin whale (International Whaling Commission, 2018). Fishery entanglements and vessel strikes are the leading human-caused source of mortality for the endangered NARW (Hayes et al., 2018). Their slow movements, time spent at the surface, and time spent near the coast make them highly vulnerable to being struck by ships.

Marine mammal species that may be at risk of vessel strike include primarily the slow-moving species (e.g., NARWs) and deep-diving species while they are on the surface (e.g., sperm whales). Generally, it is assumed that the probability of this encounter, and thus impact, is very low. Alternative 3 includes a condition of approval for vessel strike avoidance protocols. These protocols also incorporate elements of NMFS Compliance Guide for the Right Whale Ship Strike Reduction Rule (50 CFR § 224.105), which limits vessel speed to 10 kn (11.5 mph; 18.5 km/h) in the Seasonal Management Area (SMA) extending 20 nmi (23 mi; 37 km) offshore for NARWs during migration. These regulations also benefit other marine mammal species that occur in these areas.

After evaluating this information and the mitigations proposed, BOEM has determined that vessel interactions as a result of the Taylor survey are unlikely to cause mortality or physical injury and will not result in more than **negligible** impacts overall to marine mammals.

Pollution

Lost and discarded marine debris, particularly those items made of synthetic materials, is a major form of marine pollution. The types of objects most commonly encountered in offshore waters include plastic bags, wrappers, bottles, cups, and raw plastic pellets; synthetic rope; glass bottles; metal cans; lumber; and cigarette butts (Laist, 1996 and 1997; Barnes et al., 2009; Gregory, 2009). Factors that account for recent increases in marine debris include unlawful disposal practices, proliferation of synthetic materials that are resistant to degradation in the marine environment, and increasing numbers of people using and disposing of more synthetic items. Research suggests that the vast majority of microplastics in the marine environment are actually from terrestrial sources (Bergmann et al., 2015).

Marine debris poses two types of potentially negative impacts to marine biota, including marine mammals: (1) entanglement and (2) ingestion. Records suggest that entanglement is a far more likely cause of mortality to marine mammals than ingestion-related interactions. Entanglement records for marine mammals show that entanglement is most common in pinnipeds, less common in mysticete cetaceans, and rare among odontocete cetaceans (Laist et al., 1999). Entanglement data for mysticete cetaceans may reflect a high interaction rate with active fishing gear rather than with marine debris. Abrasion and chafing scars from rope and line have been reported on numbers of photographed NARWs in the western North Atlantic. These scars were attributed to entanglement in fishing gear (NMFS, 2005). Entanglement records for odontocete cetaceans that are not clearly related to bycatch in active fisheries are almost absent (Laist, 1996).

The survey operations generate trash made of paper, plastic, wood, glass, and metal. Most of this trash is associated with galley and offshore food service operations. It is prohibited to discharge trash and debris (33 CFR §§ 151.51-151.77) unless it is passed through a comminutor (a machine that breaks up solids) and can pass through a 25-mm (1-in) mesh screen. All other trash and debris must be returned to shore for proper disposal with municipal and solid waste. Some personal items, such as hardhats and personal flotation devices, are occasionally accidentally lost overboard. However, the USCG and USEPA regulations require operators to become proactive in avoiding accidental loss of solid waste items by developing waste management plans, posting informational placards, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Under the proposed action, all authorizations for offshore G&G activities would include a marine debris awareness program.

Taking into account the USCG and USEPA regulations and BOEM guidance, it is unlikely that significant amounts of trash and debris from G&G activities would be released into the marine environment. Further, the equipment described in the proposed action does not pose a threat of entanglement to marine mammals. Therefore, debris entanglement and ingestion impacts on marine mammals are expected to be avoided and are only expected to have negligible impacts on marine mammals.

An accidental event could result in the release of fuel or diesel by a survey vessel. Marine mammals could be affected by accidentally spilled diesel fuel from a vessel associated with project activities. Effects of spilled oil on marine mammals are discussed by Geraci and St. Aubin (1980, 1982, 1985, and 1990) and Lee and Anderson (2005), as well as within spill-specific study results (e.g., *Exxon Valdez*; Frost and Lowry, 1994; Paine et al., 1996). Quantities of diesel fuel on the sea surface may affect marine mammals through various pathways: surface contact of the fuel with skin and other mucous membranes; inhalation of concentrated petroleum vapors; or ingestion of the fuel (direct ingestion or by the ingestion of oiled prey). The likelihood of a fuel spill during G&G activities is considered to be remote (BOEM, 2014).

The potential impacts of a small diesel spill (1.2-7.1 barrels [bbl]; 50-298 gallons [gal]) as evaluated for the proposed action could vary depending on the spill location and the meteorological and oceanographic conditions at the time. However, in general, a small spill would be expected to disperse quickly in the open

ocean and would not be likely to contact more than a few individual marine mammals. Prolonged exposure would not be likely for any individuals in the open ocean. A small spill would be unlikely to result in the death or life-threatening injury of individual marine mammals or the long-term displacement of marine mammals from preferred feeding, breeding or calving areas, or migratory routes (BOEM, 2014). An accidental diesel fuel spill adjacent to or within the NARW critical habitat during the winter calving period could result in the direct contact of the spilled fuel with both adults and calves. Based on the predicted small size (1.2-7.1 bbl [50-298 gal]) of the spill and the likelihood that it would disperse and weather rapidly, it is likely that few individuals would be exposed and there would be no prolonged exposure for any animals. A small fuel spill, for example, would not be likely to result in the death or life-threatening injury of individual NARWs or the long-term displacement of these animals from their critical habitat or migratory routes.

Based on analysis above, impacts to marine mammals from marine trash and debris or accidental diesel fuel spills are expected to be **negligible** with the implementation of the mitigation and monitoring measures.

3.2.3 Conclusion

After evaluating the effects of the proposed action, any effects of interrelated and interdependent actions, and cumulative effects, the proposed action is not likely to jeopardize the continued existence or recovery of any ESA-listed marine mammal, including the NARW. No adverse modification of designated critical habitat (including that for the NARW) is anticipated as a result of the proposed activities in the Taylor permit application. Behavioral impacts, as a result of the proposed virbracoring, are anticipated, but not expected to exceed minor impacts as defined in this SEA, given mitigation measures included in the proposed action.

For the proposed activities, with operator adherence to the mitigation and monitoring measures as listed in this SEA, as required for the specified permitting activities, impacts to marine mammals are expected to be **minor** and consist of mostly temporary behavior change for most species and no mortality expected for any marine mammal species.

3.3 SEA TURTLES

3.3.1 Description

Five species of sea turtles are known to inhabit the area of the proposed action. These species are the loggerhead turtle, green turtle, hawksbill turtle, Kemp's ridley turtle, and leatherback turtle. All sea turtles are protected under the ESA and fall within the jurisdiction of FWS and NMFS since they are both marine and terrestrial species. These five species are all highly migratory, and individual animals will migrate into nearshore waters. Critical habitat for loggerhead sea turtles (Northwest Atlantic DPS), green sea turtles (North Atlantic DPS), hawksbill sea turtles, and leatherback sea turtles has been designated (NMFS, 2018a). No critical habitat has been designated for Kemp's ridley sea turtles. Further information, which is incorporated by reference, can be found in the Atlantic G&G PEIS (BOEM, 2014).

New Information Available Since Publication of the Atlantic G&G PEIS

Various printed and Internet sources (including publications from Federal agencies and journal articles) were examined by BOEM's subject-matter experts to assess recent information regarding sea turtles that may be pertinent to a proposed action. No new information that would add to the analyses or change the conclusions was discovered since publication of the Atlantic G&G PEIS.

3.3.2 Impact Analysis

The IPFs associated with the proposed action that could affect ESA-listed sea turtles are below and are summarized in **Table 3**. The Atlantic G&G PEIS and MMP EA contain a discussion of the potential impacts from survey operations on sea turtles. The three IPFs identified for sea turtles are

- vibratory noise;
- vessel disturbance (noise and strike); and
- pollution (e.g., trash and debris, and accidental fuel spills).

For this SEA, impacts were evaluated and assigned levels of environmental impact caused by IPFs as follows, with categories tailored as needed to fit characteristics of differing IPFs:

- **Negligible**: Negligible impacts to sea turtles would include those where little to no measurable impacts are observed or expected. There would be no mortality or serious and permanent injury to any individual sea turtle, brief disruption(s) of behavioral patterns or other non-injurious effects, and no displacement of sea turtles from preferred feeding or breeding areas, nesting beaches, or migratory routes.
- **Minor**: Minor impacts to sea turtles would be detectable but neither severe nor extensive. Minor impacts to sea turtles would include non-life-threatening injuries to one or more individuals of a sea turtle species; short-term displacement of sea turtles from preferred feeding or breeding areas, nesting beaches, or migratory routes; and little disruption of critical, time-sensitive behaviors such as nesting, breeding, or the emergence and dispersion of hatchlings.
- **Moderate**: Moderate impacts to sea turtles would be detectable and extensive but not severe. Moderate impacts to sea turtles would include limited serious injuries or mortalities in low enough numbers such that the continued viability of the population is not threatened; protracted displacement of individual sea turtles from preferred feeding or breeding areas, nesting beaches, or migratory routes; and limited disruption of critical, time-sensitive behaviors such as nesting, breeding, or the emergence and dispersion of hatchlings resulting in the loss of breeding and egg-bearing adults and hatchlings. Because of the relatively low numbers of sea turtles affected, the viability or continued existence of affected local sea turtle populations would not be threatened, although some impacts such as physical injuries and the reduction in productivity from disrupted or lost nesting opportunities may be long-term or irreversible.
- **Major**: Major impacts to sea turtles would be detectable, extensive, and severe. Major impacts to sea turtles would include extensive serious (life-threatening) injuries or mortalities in sufficiently high numbers that the continued viability of the local population is seriously threatened; long-term or permanent displacement of individual sea turtles from preferred feeding or breeding areas, nesting beaches, or migratory routes; substantial disruption (i.e., affecting large numbers of the local population) of critical, time-sensitive behaviors such as nesting, breeding, the emergence and dispersion of hatchlings resulting in the loss of breeding and egg-bearing adults and hatchlings; and destruction or adverse modification of sea turtle habitats, including feeding or breeding areas, nesting beaches, or migratory routes.

Table 3. Summary Level of Impacts for Sea Turtles

Impact Topic	Alternative 1: No Action	Alternative 2: Proposed Action as Submitted	Alternative 3: Proposed Action as Submitted with Additional Mitigation Measures
Vibratory Noise	Negligible	Negligible to Minor	Negligible to Minor
Vessel Disturbance	Negligible	Negligible	Negligible
Pollution	Negligible	Negligible	Negligible
Incremental Cumulative*	Negligible	Negligible to Minor	Negligible to Minor

*Cumulative is discussed in **Chapter 3.7**.

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 from the proposed action would not occur.

3.3.2.2 Alternative 2

If Alternative 2, the Proposed Action as Submitted, is selected, the applicant would undertake the proposed activity as requested in the application. Examples of potential impacts to sea turtles without implementation of the conditions of approval include injury from vessel noise and strikes as well as entanglement in trash and debris. This Alternative would not adequately limit or negate potential impacts to sea turtles.

3.3.2.3 Alternative 3

If Alternative 3 is selected, the Proposed Action as Submitted with Additional Mitigation Measures, it would allow the applicant to undertake the proposed activities, as requested and conditioned in the application; however, the applicant would be required to undertake mitigation measures as identified by BOEM. For the reasons set forth below, inclusion of this measure under Alternative 3 limits or negates potential impacts to sea turtles (e.g., injury from vessel noise, strikes and trash and debris). The applicant is required to have PSOs on board to watch for turtles to minimize vessel strike and disturbance. The applicant is also required to have a marine trash and debris awareness program.

Vibratory Noise

Based on the scope of the proposed action, some vibracoring sound could affect individuals from all sea turtle species within the AOI. Subadult and adult turtles may be more likely to be affected by vibratory noise than post-hatchling turtles because of the time that the former remain submerged and at depth. Post-hatchling turtles generally reside at or near the sea surface and may be less likely to be injured by the sound field produced by equipment.

There is relatively little data on sea turtle hearing. Sea turtles are low-frequency hearing specialists, typically hearing frequencies from 30 Hz to 2 kHz, with a range of maximum sensitivity between 100 and 800 Hz (Bartol and Ketten, 2006; Bartol et al., 1999; Lenhardt, 1994; Lenhardt, 2002; Ridgway et al., 1969). Hearing below 80 Hz is less sensitive but still possible (Lenhardt, 1994) and, compared to most fish and marine mammals, sea turtles have relatively low hearing sensitivity (Martin et al., 2012; Popper et al., 2014). Sea turtles could experience temporary threshold shift (TTS), behavioral changes, stress, and a reduction in prey availability. Compared to cetaceans, much less data exist on how anthropogenic sound may impact sea turtles, let alone their fitness. However, nearly all data that do exist suggest that sea turtles are much less sensitive to anthropogenic sound than cetaceans (Gomez et al., 2016; Nelms et al., 2016;

Nowacek et al., 2007; Popper et al., 2014; U.S. Navy, 2017). This may be in part because sea turtles appear to be less reliant on sound than cetaceans.

The most likely impacts on sea turtles are expected to be short-term behavioral responses of individuals in proximity to surveys. In cases where individual sea turtles cannot or do not avoid surveys and are not detected by visual observers, TTS or Permanent Threshold Shift could occur, but no deaths or life-threatening injuries are expected. Although data are limited for noise levels inducing behavioral changes in sea turtles, an analysis of the best available data indicates that impacts to sea turtles from vibracoring is expected to be **negligible** to **minor** with the mitigation and monitoring measures. More detailed information can be found in the Atlantic G&G PEIS (BOEM, 2014).

BOEM has determined that the potential impacts to sea turtles from the vibratory noise of the proposed action will be **negligible** to **minor**.

Effects on Turtle Nesting

Vibracoring conducted off of heavily used nesting beaches during the nesting season could temporarily displace adult turtles that are approaching or departing nesting beaches or resting in offshore waters between nesting events. Beaches of southeast Florida have been identified as the most important nesting area for loggerhead turtles (part of the Peninsular Florida Recovery Unit) in the western hemisphere (NMFS and FWS, 2008). Twenty-five percent of all loggerhead nesting in the U.S. is located in the Archie Carr National Wildlife Refuge (FWS, 2011a). During the 2017 nesting season, there were 23,377 loggerhead nests (25,891 green and 59 leatherback nests) in Brevard County, which is where the Archie Carr National Wildlife Refuge is located (FWCC, 2017). It is likely that large numbers of sea turtles would be present in nearshore and inner shelf waters of Brevard County during the nesting season from May 1 through October 31. Many adult females linger near the nesting beaches before and between nesting events, resting under rocky ledges and outcrops in inner shelf waters for periods of weeks.

It is unlikely that breeding adults, nesting adult females, and post-hatchlings would be negatively exposed to the temporary sound associated vibracoring. The basis for this reasoning is drawn from from NMFS determination of airgun surveys in which, given the relatively brief amount of time that an airgun survey activity would occur within breeding habitat and the small amount of area that would be affected by airgun surveys; it is not expected that airgun surveys will measurably alter the densities of breeding loggerheads (NMFS, 2018a). NMFS also concluded loggerheads may be disturbed by airgun surveys but these effects will be temporary and loggerheads will resume activities in the area quickly (NMFS, 2018a). Since the footprint of the vibracoring survey compared to an airgun seismic survey is significantly smaller in scale, BOEM concluded the impacts from vibratory noise from virbracoring surveys on turtle nesting would be less than those of airgun survey activities and are expected to be **negligible**.

Vessel Disturbance (Noise, Traffic, and Strike)

The most likely effects of vessel and equipment noise on sea turtles would include behavioral changes and possibly auditory masking. Vessel and equipment noise is transitory and generally does not propagate at great distances from the vessel; the source levels are too low to cause auditory injury in turtles (Popper et al., 2014). Based on the relatively few existing studies on the role of hearing in sea turtle ecology, it is unclear whether masking would realistically have any effect on sea turtles (Mrosovsky, 1972; Samuel et al., 2005; Nunny et al., 2008). Behavioral responses to vessels have been observed but are difficult to attribute exclusively to noise rather than to visual or other cues. Given this issue of attribution, BOEM will conservatively assume that noise associated with survey vessels may elicit behavioral changes in individual sea turtles. These behavioral changes may include evasive maneuvers such as diving or changes in swimming direction and/or speed. This evasive behavior is not expected to adversely affect these individuals or the population, and impacts are not expected to be more than **negligible**.

Sea turtles spend approximately 20-30 percent of their time at the surface for respiration, basking, feeding, orientation, and mating (Lutcavage et al., 1997). During this time, they may be at risk of vessel strike, which could result in the death of the turtle. Much less is known about vessel strike risk for turtles compared to marine mammals, though it is considered an important injury and mortality risk within the AOI (Lutcavage et al., 1997), particularly in the southern portion of the AOI off the coast of Florida (NMFS and FWS, 2008). Based on behavioral observations of turtle avoidance of small vessels, green turtles may be susceptible to vessel strikes at speeds as low as 2 knots (2.3 mph) (Hazel et al., 2007). If a sea turtle is struck by a vessel, responses can include death, serious injury, and/or minor, non-lethal injury, with the associated response depending on the size and speed of the vessel, among other factors.

Propeller and collision injuries to sea turtles arising from their interactions with boats and ships are common. From 1997 to 2005, 14.9 percent of all stranded loggerhead turtles in the U.S. Atlantic and GOM were documented as having sustained some type of propeller or collision injuries (NMFS and FWS, 2008). The most recent and available information reported that incidence of propeller wounds in sea turtles rose from approximately 10 percent in the late 1980s to a record high of 20.5 percent in 2004. Documented propeller wounds have the highest frequency of occurrence in southeast Florida (Palm Beach through Miami-Dade Counties); during some years, as many as 60 percent of the loggerhead strandings found in these areas had propeller wounds (NMFS and FWS, 2008). Green turtle recovery off the U.S. West Coast has been hampered by vessel collisions, especially when turtles are struck by an engaged propeller (NMFS and FWS, 1998a). In contrast, vessel collisions are not listed as a current threat to leatherback turtle recovery (NMFS and FWS, 1992, 1998b). It is likely that these reported injuries to sea turtles were largely caused by collisions with high-speed recreational powerboats because of the high volumes of these vessels operating in waters off southeast Florida and in other areas of the U.S.

There have been no documented sea turtle collisions with offshore survey and support vessels in areas such as the GOM, although it is possible that such collisions with small or submerged sea turtles may go undetected. Under the proposed action, authorizations for surveys would include guidance for vessel strike avoidance. With these mitigation and monitoring measures in place, survey vessels are unlikely to strike sea turtles. In addition, waters surrounding survey vessels would be monitored by PSOs for the presence of sea turtles. Vessel movements will be subject to guidance for vessel strike avoidance and will be required to reduce speed in certain areas to comply with the Right Whale Vessel Strike Reduction Rule (50 CFR § 224.105), which would further reduce the risk of a potential vessel collision with sea turtles as well.

Because turtles are below the surface 70-80 percent of the time, a collision between a project-related survey vessel and a sea turtle within the AOI is unlikely. In addition, the risk of vessel strikes on sea turtles is expected to be minimized because of (1) the guidelines for vessel strike avoidance that would be part of all authorizations for surveys under the proposed action, (2) the typical slow speed of the survey vessels, and (3) the use of PSOs to scan the sea surface around survey vessels. Considering the relatively slow operational speed of these vessels, combined with the implementation of vessel strike avoidance measures during all surveys, vessel strikes are expected to be avoided. Based on the analysis above, impacts to sea turtles from vessel noise and traffic are expected to be **negligible** with implementation of the mitigation measures. More detailed information can be found in the Atlantic G&G PEIS (BOEM, 2014).

Pollution

Lost and discarded marine debris, particularly those items made of synthetic materials, is a major form of marine pollution (Laist, 1997). Marine debris poses two types of negative impacts to sea turtles: (1) entanglement and (2) ingestion. NMFS and FWS (2008) note that loggerhead turtles have been found entangled in a wide variety of materials, including steel and monofilament line, synthetic and natural rope, plastic onion sacks, and discarded plastic netting. From 1997 to 2005, 1.6 percent of stranded loggerheads found on Atlantic and GOM beaches were entangled in fishing gear. Monofilament line appears to be the principal source of entanglement for loggerheads in U.S. waters (0.9 percent; 1997-2005 average), followed

by pot/trap line (0.4 percent; 1997-2005 average), and fishing net (0.3 percent; 1997-2005 average). Less than 1 percent of stranded sea turtles in 2005 were found entangled in other marine debris (NMFS, unpublished data, as cited in NMFS and FWS, 2008).

Taking into account the USCG and USEPA regulations and BOEM guidance regarding trash and debris (see **Chapter 3.2.2.2**), it is unlikely that significant amounts of trash and debris from the Taylor activities would be released into the marine environment, which appreciably reduces the likelihood of sea turtles encountering marine debris from the proposed activity. Further, the equipment described in the proposed action does not pose a threat of entanglement to sea turtles. Therefore, debris entanglement and ingestion impacts on sea turtles are expected to be avoided and are not expected to adversely affect sea turtles.

The potential impacts of a small diesel spill (1.2-7.1 bbl [50-298 gal]) as evaluated for the proposed action could vary depending on the spill location and the meteorological and oceanographic conditions at the time. Several aspects of sea turtle biology and behavior place them at risk, including lack of avoidance behavior, indiscriminate feeding in convergence zones, and inhalation of large volumes of air before dives (Milton et al., 2003). Studies have shown that direct exposure of sensitive tissues (e.g., eyes, nares, and other mucous membranes) and soft tissues to diesel fuel may produce irritation and inflammation and can adhere to turtle skin or shells. Turtles surfacing within or near a diesel release would be expected to inhale petroleum vapors, causing respiratory distress. Ingested diesel fuel, particularly the lighter fractions, can be acutely toxic to sea turtles. However, in general, a small diesel spill would be expected to disperse quickly in the open ocean and would not be likely to contact more than a few individual sea turtles. Prolonged exposure would not be likely for any individuals in the open ocean. A small diesel spill would be unlikely to result in the death or life-threatening injury of individual sea turtles, or the long-term displacement of sea turtles from preferred feeding, breeding, or nesting habitats or migratory routes. The assumed small size and rapid dispersion of a spill in the open ocean are the main factors mitigating the potential for significant impacts on sea turtles.

Based on the analysis above, impacts to sea turtles from marine trash and debris or accidental fuel spills are expected to be **negligible** with implementation of the mitigation measures. More detailed information can be found in the Atlantic G&G PEIS (BOEM, 2014).

3.3.3 Conclusion

For the proposed activities, with operator adherence to the mitigation and monitoring measures as listed in this SEA, as required for the specified permitting activities, impacts to sea turtles are expected to be **negligible** to **minor** and consist of mostly temporary behavior change for most species and no mortality expected for any sea turtle species.

3.4 FISH RESOURCES AND ESSENTIAL FISH HABITAT (EFH)

An Essential Fish Habitat (EFH) Assessment, in accordance with the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations, was completed as part of the MMP EA. The consultation was completed with a concurrence letter from NMFS to BOEM dated November 20, 2018. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 U.S.C. § 1801[10]). The following environmental assessment of fish resources considered (1) the specific activities proposed, (2) proposed mitigation and conditions of approval, (3) fish and invertebrate species expected within the area affected by the proposed activities, and (4) IPFs associated with the proposed activities and cumulative effects on fish resources.

3.4.1 Description

A diverse range of species is distributed throughout the Atlantic OCS, inhabiting benthic and pelagic habitats that could potentially be exposed to IPFs as a result of the proposed activities. Anthropogenic sound is the primary IPF associated with vibracoring survey activities; therefore, this SEA focuses on species commonly found in the upper (epipelagic) portion of the water column. Demersal fishes, benthic invertebrates, and seafloor habitats (including hard bottom and live bottom resources) would be negligibly impacted by the proposed activities. Highly migratory species and coastal pelagic fishes are more likely to be affected and exhibit behavioral responses, such as temporarily avoiding the vicinity of active survey operations. Descriptions of demersal and pelagic resources can be found in Chapter 4.3.5 of the Atlantic G&G PEIS (BOEM, 2014).

Habitat and Species

Resources considered in the Atlantic G&G PEIS include live/hard bottom habitats (including corals and canyon-related habitats), *Sargassum*, invertebrate resources (e.g., spiny lobster, mollusk, squid, and scallops), reef fishes (snapper-grouper complex), coastal pelagic fishes, and highly migratory species. For more information on benthic habitats, see Chapter 4.2 of the Atlantic G&G PEIS.

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is an endangered marine fish species that occurs in or around shelf waters, and could temporarily be disrupted by the proposed activities. This anadromous species occupies a wide range of habitats at various stages in life, including rivers, estuaries, bays, and coastal marine waters (Shortnose Sturgeon SRT, 2010). This species is known to inhabit waters associated with several of the states adjacent to the proposed survey area and is known to travel significant distances in the marine environment between rivers. Major threats to this species continue to be habitat loss, water quality degradation, and fisheries-related mortality.

The smalltooth sawfish (*Pristis pectinate*) is an endangered marine fish species that normally inhabits shallow waters (<10 m [33ft]), often near river mouths or in estuarine lagoons over sand or muddy substrates, but may also occur in deeper waters (<50 m [164 ft]) of the continental shelf. The smalltooth sawfish is not expected to be affected by the proposed activities due to their rare occurrence in eastern coastal Florida waters and habitat use. The smalltooth sawfish as a bottom dweller would be physically removed from vessel noise.

Two coastal pelagic species, the blueback herring (*Alosa aestivalis*) and the alewife (*Alosa pseudoharengus*), and one highly migratory species, the bluefin tuna (*Thunnus thynnus*), occur in the AOI. They are considered species of concern (NOAA, 2016), but they are not expected to be adversely impacted by the proposed activities. Though the shortnose sturgeon (*Acipenser breviortrum*) is anadromous, it mainly stays in coastal and State adjacent waters away from the area of the proposed action. Conclusions drawn in the Section 7 Consultation Under the Endangered Species Act: Programmatic G&G Activities in the Mid-Atlantic and South Atlantic Planning Areas from 2013 to 2020; Biological Opinion are that no harm or harassment will occur to listed sturgeon species from vibracoring. No effect conclusions were drawn in the 2019 MMP NMFS ESA (NMFS, 2019b) for the listed sturgeon species, and the smalltooth sawfish.

3.4.2 Impact Analysis

Only those IPFs specific to the area and proposed action are discussed in this SEA and are summarized in **Table 4**; a wider range of potential IPFs was analyzed in the Atlantic G&G PEIS due to the broader focus of that analysis. The IPFs identified for fish resources are

- vibratory noise
- vessel disturbance (noise), and
- pollution (accidental fuel spills).

For this SEA, impacts were evaluated and assigned levels of environmental impact caused by IPFs as follows, with categories tailored as needed to fit characteristics of differing IPFs:

- **Negligible**: Negligible impacts to fish resources would include those where little to no measurable impacts are observed or expected. There would not be any adverse effects on a federally managed fish species or any adverse effect on EFH.
- **Minor**: Minor impacts to fish resources would include those that are detectable but are neither severe nor extensive. Minor impacts to fish resources would include temporary displacement or disruption of important behavioral patterns of federally managed fish species. Minor impacts would also include a spatially limited impact to EFH.
- **Moderate**: Moderate impacts to fisheries resources would be detectable and extensive but not severe. Moderate impacts to fish resources would include some degree of population-level physiological/anatomical damage to, population-level mortality to, or extended displacement of large numbers (i.e., population level) of a federally managed fish species. Moderate impacts would also include extensive damage (quantifiable loss depending on the habitat type) to EFH or extensive disruption of behavioral patterns (including spawning, feeding, or ontogenetic migrations) that may adversely affect a species.
- **Major**: Major impacts to fish resources would be detectable, extensive, and severe. Major impacts to fish resources would include a high level of physiological/anatomical damage to, mortality to, or extended, long-term displacement of a federally managed fish species. Major impacts would also include extensive, long-term damage (quantifiable loss depending on the habitat type) to EFH, or extensive, chronic disruption of behavioral patterns (including spawning, feeding, or ontogenetic migrations) that would adversely affect a species.

Table 4. Summary Level of Impacts for Fish Resources*

Impact Topics	Alternative 1: No Action	Alternative 2: Proposed Action as Submitted	Alternative 3: Proposed Action as Submitted With Additional Mitigation Measures
Vibratory Noise	**Negligible**	**Negligible**	**Negligible**
Vessel Disturbance	**Negligible**	**Negligible**	**Negligible**
Pollution	**Negligible**	**Negligible**	**Negligible**
Incremental Cumulative**	**Negligible**	**Negligible**	**Negligible**

*EFH is not analyzed for reasons described above

Cumulative is discussed in **Chapter 3.7.

Fishes that remain in the vicinity of an active vibracoring could experience a temporary threshold shift or masking of biologically relevant sounds, but these effects would be expected to be short-term. Vessel and equipment noise is generally considered continuous. All vessels produce underwater noise, but the characteristics widely vary depending on the vessel, speed, onboard mechanical systems, and other factors. The greatest contribution to low-frequency background noise results from propeller cavitation. Impacts on fish behavior as a result of increased vessel operations associated with the proposed activities are expected to be short-term and localized to survey areas and they would be almost indistinguishable from existing conditions. Overall, impacts to fish as a result of the proposed activities are expected to be **negligible**.

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 from the proposed action would not occur.

3.4.2.2 Alternative 2

If Alternative 2 is selected, the Proposed Action as Submitted, it would allow the applicant to undertake the proposed activities, as requested in the application. The activity will have negligible impacts to fish and EFH.

3.4.2.3 Alternative 3

If Alternative 3 is selected, the Proposed Action as Submitted with Additional Mitigation Measures, it would allow the applicant to undertake the proposed activities; however, the applicant would be required to undertake additional mitigation measures as identified by BOEM. The inclusion of the smalltooth sawfish conditions would further limit vessel impacts to fish.

Vibratory Noise and Vessel Disturbance (Noise and Traffic)

Hearing mechanisms in fishes have been studied extensively (Fay and Popper, 2000; Ladich and Popper, 2004; Webb et al., 2008), but the specific hearing capabilities of species and the received-sound levels where potentially adverse impacts may occur are not well understood. Furthermore, Popper and Fay (2011) suggest that the broad designation of fishes as "hearing specialists" and "hearing generalists" is not sufficient to classify the hearing abilities of fishes. They recommend that the range of hearing capabilities across species is more like a continuum that includes the relative contributions of hydrostatic pressure to the overall hearing capabilities of a species. Although studies have investigated physiological impacts (McCauley et al., 2000a; McCauley et al., 2003; Morris et al., 2018) and behavioral response (Skalski et al., 1992; Engås et al., 1996; Slotte et al., 2004; Løkkeborg et al., 2012; Fewtrell and McCauley, 2012; Bruce et al., 2018) in several species, results should not be generally applied at the population level (National Science Foundation, 2011). As noted by Carroll et al. (2017), for purposes of extrapolating from studies to specific survey operations, it is important to mimic realistic conditions as closely as possible. However, information gaps are widely recognized (Hawkins et al., 2014; Popper et al., 2014; Popper and Hawkins, 2018) and only broad guidance has been developed to minimize potential impacts to fishes resulting from anthropogenic sound exposure. Through these measures and the information available, BOEM is able to assume impacts to fish at a level that the decision maker can make an informed decision amongst the alternatives.

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). Anthropogenic (human-generated) sounds introduced to the marine environment have the potential to mask biologically relevant signals, modify behavior, reduce hearing sensitivity, and/or cause physiological injury. Masking could reduce foraging success, increase predation, or disrupt reproduction. Studies suggest that responses to anthropogenic sound can vary, even among members of the same species. However, startle responses generally include avoidance or movement away from adverse conditions, but it may vary over time and with frequency of exposure to a particular signal. Specific effects depend on the signal characteristics, duration of exposure, proximity to the source, and fish species (Popper and Hastings, 2009). Furthermore, injury to fishes as a result of rapid changes in pressure (barotrauma) may occur in close proximity to an intense sound source.

Pollution

The increase in the potential for accidental fuel spills during vibracoring activities is considered to be extremely small. Should a spill occur from the survey vessel, the reasonably foreseeable spill would be a small amount, most of which would be volatilized at the sea surface. The impacts associated with the proposed action and the low probability of a survey activity-related fuel spill are **negligible**.

3.4.3 Conclusion

The temporary (short term) nature of the survey, the small area of the ocean affected at one time during the survey relative to the overall Atlantic, and the ability of fishes to temporarily move away from noise that is affecting them, suggests that the impacts from vibracoring surveys to fish resources would be **negligible**.

3.5 ARCHAEOLOGICAL RESOURCES

3.5.1. Description

Archaeological resources are any material remains of human life or activities that are at least 50 years of age and that are of archaeological interest (30 CFR § 551.1). As obligated under OCSLA regulations (30 CFR § 551.6 (a) (5)), applicants are not allowed to disturb archaeological resources while conducting their survey activities.

Submerged cultural resources within the proposed study area may include both historic and pre-contact archaeological sites. Historic archaeological resources include shipwrecks and aircraft. Based on research conducted to produce BOEM's proprietary Atlantic Shipwreck Database (TRC, 2011), there are over 1,000 known and reported shipwrecks offshore of Florida's Atlantic coast. The historic record, however, is by no means complete and many more shipwrecks are likely to exist on the seafloor than have been accounted for in available historic literature. Currently, a high-resolution remote sensing survey is the most reliable method for identifying and avoiding historic archaeological resources.

Submerged pre-contact period occupation sites and landforms with the potential to contain these sites may also be present within the proposed study area, depending on regional landform and sea level rise variation. Based on the current understanding of sea level rise and the earliest date of human occupation, any existing pre-contact period sites on the OCS would be located in the nearshore zone (< 60 m [197 ft] water depth). Additionally, pre-contact period sites would most likely be found in the vicinity of paleo-channels or river terraces that offer the highest potential of site preservation; however, preservation conditions are variable and depend on local geomorphological conditions and the speed of sea level rise. Since the purpose of the proposed project is to characterize relatively recent sand deposits on the OCS, it is unlikely that any underlying Holocene and Pleistocene landforms that may be present will be disturbed during geological sampling.

3.5.2. Impact Analysis

The IPF associated with the proposed action that could affect archaeological resources are summarized in **Table 5**. The Atlantic G&G PEIS and MMP EA contain a discussion of the potential impacts from survey operations on marine mammals (BOEM, 2014 and BOEM, 2018). The IPFs identified for archeological resources are

- seafloor disturbance; and
- pollution (e.g., trash and debris, and accidental fuel spills).

For this SEA, impacts were evaluated and assigned levels of environmental impact caused by IPFs as follows, with categories tailored as needed to fit characteristics of differing IPFs:

- **Negligible**: Negligible impacts to archaeological resources would include those where little to no measurable impacts are observed or expected. Negligible impacts would also include any effects upon suspected archaeological resources on the seafloor that are determined to be modern debris.
- **Minor**: Minor impacts to archaeological resources would include those that are detectable but are neither severe nor extensive. Minor impacts to archaeological resources would include impacts arising from any activity that results in the alteration of, or causes a change to, stable environmental conditions for a significant submerged cultural resource. Further, such alteration would not affect the significance of a submerged cultural resource or directly or indirectly result in the loss of diagnostic features or research potential of a submerged cultural resource.
- **Moderate**: Moderate impacts to archaeological resources would be detectable and extensive but not severe. Moderate impacts to archaeological resources would include impacts arising from any activity that results in the alteration of stable environmental conditions for a significant submerged cultural resource. However, in contrast to minor impacts, such alteration has the potential to affect the significance of a submerged cultural resource or directly or indirectly result in the loss of diagnostic features or research potential of a submerged cultural resource.
- **Major**: Major impacts to archaeological resources would be detectable, extensive, and severe. Major impacts to archaeological resources would include any G&G activity that results in the permanent loss or damage to diagnostic features or research potential of a submerged cultural resource, disturbance of human remains associated with identified submerged cultural resources, adverse change in the significance of a submerged cultural resource, or exposure of previously buried features to harmful environmental conditions.

Table 5. Summary Level of Impacts Archaeological Resources

Impact Topic	Alternative 1: No Action	Alternative 2: Proposed Action as Submitted	Alternative 3: Proposed Action as Submitted with Additional Mitigation Measures
Seafloor Disturbance	Negligible	Negligible to Minor	Negligible to Minor
Pollution	Negligible	Negligible	Negligible
Incremental Cumulative*	Negligible	Negligible to Minor	Negligible to Minor

*Cumulative is discussed in **Chapter 3.7**.

3.5.2.1. Alternative 1

If Alternative 1, the No Action Alternative, is selected the applicant would not undertake the proposed activities. Therefore, the IPFs to archaeological resources would not occur.

3.5.2.2. Alternative 2

If Alternative 2, the Proposed Action as Submitted, is selected the applicant would undertake the proposed activities, as requested in the application. Examples of potential impacts to archaeological resources without implementation of the conditions of approval noted in the following analysis include, but are not limited to, damage to potential archaeological resources from the proposed vibracoring activities. The operator

proposes vibracoring activities at sites that may be located near potential archaeological resources which, without additional conditions of approval, may lead to potential impacts to those sites.

3.5.2.3. Alternative 3

If Alternative 3, the Proposed Action as Submitted with Additional Mitigation Measures, 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 mitigation and monitoring measures as identified by BOEM. The mitigation and monitoring measures outlined in **Appendix A** are expected to decrease or negate the potential for impact to archaeological resources from the proposed action. For the reasons set forth below, inclusion of these measures under Alternative 3 further limits or negates potential impacts to archaeological resources.

Routine Activities

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

Pollution

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

Based on the analysis above, impacts to archaeological sites from Pollution are expected to be **negligible** with implementation of the mitigation measures.

3.5.3 Conclusion

The impacts from vibracoring are expected to be **negligible to minor** since the operator will have their HRG survey in hand that should indicate possible sites to avoid. Adherence to applicable mitigations and monitoring measures will further minimize potential impacts from the vibracoring.

3.6 OTHER MARINE RESOURCES AND SPACE-USE CONSIDERATIONS

Marine space-use conflicts are a continuing concern and are an important element in marine spatial planning (Crowder and Norse, 2008; Douvere and Ehler, 2009). Whenever activities take place on the OCS, there is the potential for space-use conflict that must be evaluated prior to conducting regulated activities. Most of the activities are competing for very small footprints on the OCS; only a few of them permanently or temporarily compete directly for large areas of the OCS on a semi-continuous basis. These exceptions include military range complexes, civilian space program use, and commercial and recreational fishing. All of these activities spatially coexist with other activities on the OCS, but differ in their potential for space-use conflict by their degree of permanence or frequency. There are no marine protected areas located within or adjacent to the proposed survey activities.

3.6.1 Description

Military Activities

Military activities have the potential for creating temporary space-use conflicts on the OCS. The proposed survey is located within Military Warning Area W-158E in the Jackson Operating Area. DOD activities include the development, training, and testing of weapons and systems that support the missions of the DOD. These activities include the use of active sonar, explosives, lasers, cannons, and other munitions.

In the GOM, an area heavily explored for oil and gas prospects, in addition to existing leases, a Military Areas Stipulation is required for leased OCS lands that specify points of contact between industry operators and DOD facility operators to reduce potential impacts, particularly in regards to safety. Military and all other GOM activities essentially coexist, except under prearranged circumstances. The reduction in potential impacts resulting from this stipulation makes multiple-use conflicts unlikely, but without it some potential conflict with respect to safety issues is likely. The best indicator of the overall effectiveness of the stipulation may be that there has never been an accident involving a conflict between military operations and exploration activities in the GOM. Military coordination measures would be a condition of G&G activities permit approval (i.e., similar to NTL 2014-G04, "Military Warning and Water Test Areas," the military coordination lease and permit stipulation in effect in the GOM).

If the Taylor G&G permit is approved, BOEM will require the G&G operator to notify the designated DOD personnel of the nature and schedule for any pending G&G activity planned within military range complexes. Further coordination occurs at the commencement of activities. BOEM would be involved in these communications between the G&G operator and DOD.

In conclusion, with BOEM's extensive experience in the GOM with G&G activities and a stipulation for Taylor to coordinate with DOD prior to survey activities, the potential for multi-use or space unse conflict to occur is extremely low and considered **negligible**.

Vessel traffic levels and vessel exclusion zones associated with G&G activities are small and of limited duration but could be an obstruction to surface use by military units, depending upon their location. Potential impacts of G&G activities to military range complexes use would be negligible and avoidable when coordinated with DOD prior to commencement.

Military coordination is a measure to be included in the G&G permits that BOEM will issue, and all vessel operators and contractors actively engaged in G&G surveys are required to establish and maintain early contact and coordination with the appropriate military range complex or command headquarters in order to

avoid or minimize conflicts with potentially hazardous military operations. BOEM and DOD actively coordinate with each other and other agencies through interagency working groups established through State-Federal interagency task forces and through regional planning efforts, which are all formed to avoid conflicts.

Commercial and Recreational Fisheries

According to the most recent and available economic data, in 2017 South Atlantic commercial fisheries[2] generated $195.2 million in landings (NMFS, 2019a). In the South Atlantic, recreational fishing expenditures in 2015 totaled $5.3 billion, and the total number of recreational fishing trips was estimated at 16.5 million. A total of 77,639 combined fisheries industry jobs (excluding import-related jobs) were reported for 2015 in the South Atlantic (NMFS, 2017a).

Commercial and recreational fishing has the potential to cause semi-permanent, space-use conflicts on the OCS. Marine space-use conflicts are an existing issue between many competing fisheries.

Prior to conducting a vibracoring survey, operators would submit information to the local USCG office and local harbormaster for issuance of a Local Notice to Mariners. The Local Notice to Mariners would specify the survey dates and locations and the recommended avoidance requirements. The G&G vessel traffic and vessel exclusion zones may temporarily interrupt fishing activities, including setting of fishing gear. In addition, survey vessel traffic has the potential to interfere with commercial fishing operations, especially dredges, otter trawls, longlines, and purse seines. Communication requirements and protocols implemented as part of the Local Notice to Mariners for the proposed survey is expected to minimize the potential for multi-use conflicts in the proposed survey area. Any impacts would be localized and short term and are expected to be **negligible**.

Shipping and Marine Transportation

Large commercial vessels (i.e., cargo ships, tankers, and container ships) use ports to access overland rail and road routes to transport goods throughout the U.S. Other vessels using ports include military vessels, commercial business craft (i.e., tug boats, fishing vessels, and ferries), commercial recreational craft (i.e., cruise ships and fishing/sightseeing/diving charters), research vessels, and personal craft (i.e., fishing boats, house boats, yachts and sailboats, and other pleasure craft). One commercial deepwater port is located along the coast in Jacksonville, Florida. Preclusion of commercial ships from shipping lanes constitutes a space-use conflict. At the time of their application, Taylor indicated that the St. Augustine port will be their shorebase for their proposed activities.

The USCG designates shipping fairways and establishes traffic separation schemes that control the movement of vessels as they approach ports (33 CFR § 166). Each of the ports is serviced by a navigation channel maintained by the U.S. Army Corps of Engineers (USACE). Traffic fairways and the buoys and beacons that serve as aids to navigation are identified on NOAA's Office of Coast Survey's navigation charts.

Impacts from G&G activities on shipping and marine transportation could (dependent upon location and timing) result in possible short-term and temporary limited access to routes when the G&G vessels are surveying in fairways or transit routes. The proposed vessel is likely to return to port everyday for the duration of the survey. These vessels will operate for a limited duration. Moreover, commercial shipping vessels would be notified of G&G activities through the Notice to Mariners process in advance of any vibracoring surveys. The Notice to Mariners would specify the survey dates and locations and the

[2] *South Atlantic fisheries commercial landing totals include all of eastern Florida. Florida includes both the Straits of Florida and the South Atlantic Planning Areas. The NMFS landing data query is not based on BOEM's planning area designations; therefore, the landing totals from 2016 for the South Atlantic Planning Area would be less than the total provided.*

recommended avoidance requirements. Vessel traffic expected under the proposed action would be an insufficient increase to potentially cause impacts to shipping and marine transport, and these impacts are expected to be **negligible** because the duration of this survey is small in relation to the existing vessel traffic throughout the AOI.

Marine Protected Areas

In 1975, the State of Florida enacted the Aquatic Preserve Act. Under the APA, the State of Florida manages 41 aquatic preserves. The proposed action would occur within open ocean portion of the Guana River Marsh Aquatic Preserve (**Figure 2**). The Guana River Marsh Aquatic Preserve includes both onshore and offshore lands. Approximately 9,500 acres are managed by the Florida Fish and Wildlife Conservation Commission (FFWCC) and 2,600 acres are managed by the Florida Coastal Office (FCO), which is a division of the Florida Department of Environmental Protection (FDEP).

Guana River Marsh Aquatic Preserve has a rich association of habitats including saltmarshes, a large artificial freshwater-to-brackish water lagoon, open ocean and a complete cross-section of a relatively undisturbed barrier island. This diversity provides habitat for a wide variety of resident and migratory wildlife. Bird rookeries, including a sizable breeding population of the endangered wood stork, are found within the preserve. The preserve also contains 13 miles of high-energy beach fronting the Atlantic Ocean with high dunes (35 to 40 feet) and stabilized with native coastal vegetation. These beaches provide breeding and nesting habitat for sea turtles and ground-nesting shorebirds such as the threatened least tern.

FFWCC and FCO were contacted by BOEM in February 2019 and the State agencies informed BOEM the proposed action did not require a permit in State Waters. In addition, CZM consistency certification was provided by the FCO with no objections.

3.6.2 Impact Analysis

Only those IPFs specific to the area and proposed action are discussed in this SEA and summarized in **Table 6**; a wider range of potential IPFs was analyzed in the Atlantic G&G PEIS and MMP EA due to the broader focus of that analysis. The IPFs relevant to the proposed action regarding other marine uses include (1) vessel disturbance (includes traffic) and (2) pollution.

For this SEA, impacts were evaluated and assigned levels of environmental impact caused by IPFs as follows, with categories tailored as needed to fit characteristics of differing IPFs:

- **Negligible**: Negligible impacts to other marine uses would include those where little to no measurable impacts on other marine uses are observed or expected.
- **Minor**: Minor impacts to other marine uses would include those that are detectable but are neither severe nor extensive. Minor impacts to other marine uses would include limited, localized, temporary, and short-term disruptions of other marine uses (from vessel traffic, vessel exclusion zones, space-use conflicts, and/or seafloor disturbance).
- **Moderate**: Moderate impacts to other marine uses would be detectable and extensive but not severe. Moderate impacts to other marine uses would include detectable disruptions of other marine uses (from vessel traffic, vessel exclusion zones and space-use conflicts, and/or seafloor disturbance).
- **Major**: Major impacts to other marine uses would be detectable extensive, and severe. Major impacts to other marine uses would include any G&G activity that results in (1) a substantial increase in the volume of vessel traffic for an extended period over a large area resulting in an interruption of other marine uses; (2) broad-scale, long-term vessel

exclusion zones resulting in long-term, space-use conflicts with other marine uses; and/or (3) severe and extensive disturbance to the seafloor.

Table 6. Summary Level of Impacts Per Alternative for Other Marine Uses Combined

Impact Topics	Alternative 1: No Action	Alternative 2: Proposed Action as Submitted	Alternative 3: Proposed Action as Submitted with Additional Mitigation Measures
Vessel Disturbance	Negligible	Negligible	Negligible
Pollution	Negligible	Negligible	Negligible
Incremental Cumulative*	Negligible	Negligible	Negligible

Cumulative is discussed in **Chapter 3.7.

There are extensive existing marine uses in the Atlantic, including commercial and recreational fishing, shipping and marine transportation, military exercises and testing, sand and gravel mining, dredged material disposal, research activities, and known sea-bottom obstructions that could occur in proximity to the action area. Impacts on other marine uses due to increased vessel operations associated with the proposed activities are expected to be temporary, short-term, and localized to survey areas, and they would be indistinct from existing conditions. With operator adherence to applicable mitigation measures, impacts to other marine uses as a result of the proposed action are expected to be **negligible**.

3.6.2.1 Alternative 1

If Alternative 1, the No Action Alternative, is selected, the applicant would not undertake the proposed activities. Therefore, the IPFs to other marine uses from the proposed action would not occur.

3.6.2.2 Alternative 2

If Alternative 2 is selected, the Proposed Action as Submitted, it would allow the applicant to undertake the proposed activities, as requested in the application. The activity could potentially interfere or interrupt commercial and recreational fishing, shipping/transportation, or military activities.

3.6.2.3 Alternative 3

If Alternative 3 is selected, the Proposed Action as Submitted with Additional Mitigation Measures, it would allow the applicant to undertake the proposed activities, as requested; however, the applicant would be required to undertake additional mitigation measures as identified by BOEM. The activity will have **negligible** impacts to commercial and recreational fishing, shipping/transportation, marine protected areas, and military activities.

Vessel Disturbance (Traffic)

The level of vessel traffic related to the proposed action would not represent a significant increase in total vessel traffic when compared with existing vessel traffic in offshore waters.

The proposed action is within a military warning area, and the proposed survey is subject to restrictions imposed by military, rules, and regulations. Vessel traffic levels associated with G&G activities are small and of limited duration but could be an obstruction to surface use by military units, depending upon their location. Potential impacts of G&G activities to military areas are expected to be negligible and would be avoided because a stipulation for coordination with DOD will be required prior to commencement of the proposed survey activity. This notification and communication requirement ensures that authorities are

aware of the proposed survey activity schedule and would provide a mechanism to avoid scheduling conflicts, should the need arise.

Overall, impacts to military, commercial and recreational fishing would be of relatively short duration, temporary in nature, with the time and extent dependent on the location of the survey vessel in relation to other vessel traffic in the area. Impacts are expected to be **negligible** because of the temporary, short-term nature of the proposed activity, understanding that activities would be widely distributed in time and space, with notification and communication stipulations, as well as required military coordination stipulation.

Pollution

Most trash generated offshore during G&G activities is mainly associated with galley and offshore food service operations. However, food service operations are not expected with the proposed survey as the vessel will return to shore on a daily basis. Although companies operating offshore have developed and implemented trash and debris reduction and improved handling practices in recent years to reduce the amount of offshore trash that could potentially be lost into the marine environment, trash and debris could be accidentally lost overboard during G&G activities.

Survey vessels performing work within U.S. jurisdictional waters are expected to comply with Federal regulations including MARPOL 73/78, and all authorizations for surveys would include guidance for marine debris awareness and pollution control plan. Only accidental loss of trash and debris is anticipated. Impacts from trash and debris and accidental spill as generated by the proposed action to other marine resources and uses would be **negligible**.

3.6.3 Conclusion

The temporary (short term) nature of the survey, the small area of the ocean affected at one time during the survey relative to the overall Atlantic suggests that the impacts from vibracoring to other marine resources and uses would be **negligible**. With notification and communication stipulations, the potential impacts from vessel disturbance by the proposed action are expected to be **negligible**. With the implementation of the guidance for marine trash and debris, impacts from pollution generated by the proposed action to other marine resources and uses would be **negligible**.

3.7 INCREMENTAL CUMULATIVE IMPACT ANALYSIS

Cumulative effects (40 CFR § 1508.7) refers to impacts on the environment that result from the incremental increase in impact from the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. This SEA identifies potentially important cumulative effects associated with the proposed action and the following:

- other G&G activities;
- marine minerals use;
- military operations;
- shipping and marine transportation;
- commercial and recreational fishing;
- disease (marine mammals only);
- marine trash and debris;
- climate change; and
- ambient noise.

3.7.1 Description

Other G&G Activities

This cumulative analysis specifically evaluates the Taylor proposed action when viewed in conjunction with the other reasonably foreseeable G&G activity. The Taylor survey and 13 other G&G permit applications are currently pending before BOEM. Of the 14 pending surveys, 9 are for G&G surveys to identify oil and gas resources and are located further north than this activity; most of which utilize airguns. The other surveys are non-airgun HRG surveys related to marine minerals.

Cumulative G&G activities would produce a variety of different sounds, including those associated with vessel and aircraft operations, echosounders, and airguns, that may produce an acoustic disturbance. It would also involve the presence of vessels (and associated gear) and aircraft that produce a visual disturbance. Noise from G&G operations would be survey- or activity-based and so would occur on a transient and intermittent basis over the period of interest. Active acoustic sound sources included in the cumulative activities may include airguns, boomer and chirp subbottom profilers, side-scan sonars, and multibeam depth sounders. Table 3-11 of the Atlantic G&G PEIS summarizes characteristics of these sources. Table 2-1 of the MMP EA also details the characteristics of sources uses for sand surveys. Detailed characteristics and assumptions for representative sources are discussed in Appendix D of the Atlantic G&G PEIS. Vessel and equipment noise is described in Chapter 3.5.1.2 of the Atlantic G&G PEIS. Other G&G activity-related sound impacts have the potential to adversely affect marine mammals, sea turtles, fish resources, and other marine uses.

Vessel strikes are the other main source of cumulative impacts in the AOI. The overall direct and indirect effects and cumulative impact determinations remain the same for both Alternatives 2 and 3. In the rare chance there would be surveys occurring throughout the Atlantic OCS at the same time, the mitigation measures required would still protect species in the potential impact areas. Also, if surveys occur sequentially there would be operational lag time between surveys that would allow species to leave the area and recover from the temporary disturbance of previous surveys.

Other Marine Minerals Uses

BOEM has the authority to issue noncompetitive negotiated agreements and leases for use of marine minerals from the OCS. Sand and gravel transported from offshore sites are primarily used for shore protection, wetland restoration, and beach nourishment to restore damage caused by erosion and impacts from human activities, storms, or sea-level rise. A number of areas along the Atlantic Coast were severely damaged by Hurricanes Sandy, Matthew, and Irma. As a result, BOEM has been working with U.S. Army Corps of Engineers and States on restoration projects. These activities are reasonably foreseeable for all OCS regions. Dredging activities to date have been limited to the GOM and Atlantic regions, with increases in both the number of leases and volume of sand requested in the last decade.

Marine mineral uses contribute acoustic noise from G&G surveys used before, during, and after OCS dredging activities. Marine mineral activities may increase vessel traffic, which adds noise to the marine environment and presents risk of strike. **Table 7** provides a summary of anticipated future marine mineral activities off the Atlantic coast of Florida. Currently, all marine minerals projects are located close to shore and are within 30-km (19-mi).

Table 7. Summary of Marine Mineral Activities off the Coast of Florida

Active Negotiated Agreements					
State	Lessee(s)	Agreement Expiration Date	Project Area	Volume (yd^3)	Construction Status
FL	Duval County (Amendment)	4/12/2019	10-mi shoreline between St. John's River Entrance and Duval/St. Johns County Line	2,400,000	Construction began in October 2018
FL	Brevard County (N, S Reach)	10/11/2020	Two shoreline segments totaling 13.4 mi along central Brevard County	1,700,000	Completed on 4/10/2018
FL	Patrick AFB (Amendment)	1/12/2019	Shoreline adjacent to Patrick AFB	465,000	Not Begun

Marine mineral activities must adhere to mitigations that would reduce impacts from the associated activities to biological resources (i.e., marine mammals, sea turtles, and fish and EFH). However, as coastal erosion continues to increase from intensified storms and sea-level rise, beach nourishment activities are expected to increase in the coming decades. In addition, dredging to deepen or maintain channels may deposit material at ocean disposal sites, as regulated by USEPA. These dredging and disposal operations in the Atlantic could increase acoustic noise and turbidity, and entrain, injure, or kill sea turtles. However, the mitigation measures aim to decrease entrainment risk and impacts for protected sea turtles.

As explained above, marine mineral G&G-related activities have the potential to adversely impact marine mammals, sea turtles, fish resources, and other marine uses, and the contribution of this cumulative IPF has been incorporated into the specific resource impact discussions and conclusions below.

Military Operations

Since publication of the Atlantic G&G PEIS and MMP EA, the Navy published their AFTT Final EIS/OEIS in September 2018, which contains a summary and analysis of current and expected future Navy operations within and adjacent to the AOI (U.S. Navy, 2018). According to the Navy's AFTT Final EIS/OEIS, "Weapons noise, vessel noise, aircraft noise, the use of in-water electromagnetic devices, high-energy lasers, in-water devices, seafloor devices, wires and cables, decelerators/parachutes, biodegradable polymers, and military expended materials are not expected to result in Level A or Level B harassment of any marine mammals" (U.S. Navy, 2018). However, the Navy proposes to take individuals of 39 marine mammal species by Level A and B harassment incidental to training and testing activities from the use of sonar and other transducers, in-water detonations, airguns, and impact pile driving/vibratory extraction. Although there are significant differences in the acoustic properties of vibracoring surveys and military sonar (such as waveforms, pulse duration, operational frequency, and sound energy direction), both sound sources have the potential to impact resources in their own way.

Shipping and Marine Transportation

It is expected that recent trends showing increases in marine transportation and shipping levels at U.S. East Coast ports will continue and that overall vessel traffic within the AOI will increase (Ward-Geiger et al., 2005). More than 54,000 vessel transits (involving commercial vessels of at least 150 gross registered tons) occur at U.S. east coast ports per year (BOEM, 2014). Table 3-13 of the Atlantic G&G PEIS depicts a summary of vessel activity in the AOI by activity type. Vessel strikes are the other main source of cumulative impacts in the AOI, which includes critical habitat for certain sea turtles and the NARW.

The proposed action will have a **negligible** and possibly not even discernable incremental contribution to the risk of vessel strikes, compared to other sources. BOEM-permitted G&G vessel activities involve a much lower risk of vessel strikes than most shipping sources because the proposed activity will not

measurably add to current vessel activity. The size of the *Artemis* vessel, proposed to be used by Taylor, is 35 ft. Mitigation measure requirements specially related to vessel strike avoidance for visual observers to continually watch for marine mammals and sea turtles during transit and PSOs are a requirement during active survey activities.

Commercial and Recreational Fishing

Numerous commercial fisheries operate within the AOI, including pelagic longlines, trawls (surface, mid-water, or bottom), gillnets, purse seines, hook-and-lines, pound nets, and more. Several ports within the AOI have some of the highest commercial fishing revenue in the U.S., and dozens of fishing communities exist along the coast (BOEM, 2014). As of 2016, commercial landings within the AOI totaled over roughly 250,096 metric tons (NMFS, 2018e).

An unintended consequence of the fisheries industry is potential injury and mortality; therefore, it would remain as an adverse IPF for marine mammals and sea turtles. In recent decades, NMFS has created multiple Take Reduction Plans for some fisheries that result in substantial bycatch of marine mammals. These include the Harbor Porpoise Take Reduction Plan to reduce interaction between harbor porpoises and commercial gillnet gear (relevant in the Mid-Atlantic); the Atlantic Trawl Gear Take Reduction Team, which addresses bycatch of common dolphins and white-sided dolphins in Atlantic trawl fisheries; and the Pelagic Longline Take Reduction Plan, which addresses incidental mortality and serious injury for pilot whales and Risso's dolphins from pelagic longline fisheries. NMFS also implemented an Atlantic Large Whale Take Reduction Plan in 1997 to reduce injuries and deaths of large whales due to incidental entanglement in fishing gear. Further, for the period 2012 through 2016, the minimum rate of annual human-caused mortality and serious injury to right whales from incidental fishery entanglement was 5.15 per year. This has led to a NARW UME event and is being investigated.

As discussed above, commercial and recreational fishing activities have the potential to adversely impact marine mammals, sea turtles, fish resources, and other marine uses, and the contribution of this cumulative IPF has been incorporated into the resource impact discussions and conclusions below.

Marine Trash and Debris

Marine debris originates from both land-based and ocean-based sources. Forty-nine percent of marine debris originates from land-based sources, 18 percent originates from ocean-based sources, and 33 percent originates from general sources (sources that are a combination of land-based and ocean-based activities) (USEPA, 2009). Ocean-based sources of marine debris include galley waste and other trash from ships, recreational boaters, fishermen, and offshore operations. Commercial and recreational fishers produce trash and debris by discarding plastics (e.g., ropes, buoys, fishing line and nets, strapping bands, and sheeting), wood, and metal traps. Some trash items, such as glass, pieces of steel, and drums with chemical or chemical residues, can be a health threat to local water supplies and, as a result, to biological, physical, and socioeconomic resources; beachfront residents; and users of recreational beaches. To compound this problem, there is population influx along the coastal shorelines. These factors, combined with the growing demand for manufactured and packaged goods, have led to an increase in non-biodegradable solid wastes in our waterways.

Marine debris affects marine habitats and marine life worldwide, primarily by entangling or choking individuals that encounter it (Gall and Thompson, 2015). Entanglement in marine debris can lead to injury, infection, reduced mobility, increased susceptibility to predation, decreased feeding ability, fitness consequences, and mortality for all ESA-listed species in the AOI. Entanglement can also result in drowning for air breathing marine species, including sea turtles and cetaceans. Marine debris ingestion can lead to intestinal blockage, which can impact feeding ability and lead to injury or death. Data on marine debris in some locations of the AOI is largely lacking; therefore, it is difficult to draw conclusions as to the extent of the problem and its impacts on populations of any species.

Vessel operators, crew, and personnel present on offshore structures are required to comply with the requirements of Federal regulations, which incorporate the requirements of MARPOL 73/78, including Annex V. In addition, all authorizations for shipboard surveys would include guidance for marine debris awareness. Compliance with Federal regulations, which include MARPOL requirements and included as a mitigation measure for permit approval, ensure that the volume of trash and debris that may be intentionally dumped offshore is very limited. The G&G activities conducted under the proposed action could potentially add a small amount of accidentally released trash and debris into offshore waters.

Marine trash and debris have the potential to adversely impact marine mammals, sea turtles, fish resources, and other marine uses; the contribution of this cumulative IPF has been incorporated into the specific resource impact discussions and conclusions below.

Climate Change

Global climate change could significantly affect marine resources in the Atlantic (NMFS, 2018b). Possible impacts include temperature and rainfall changes, rising sea levels, and changes to ocean conditions, such as ocean circulation patterns and storm frequency. These changes may affect marine ecosystems in the AOI by increasing the vertical stratification of the water column, shifting prey distribution, impacting competition, and generally impacting species' ranges (Richardson and Schoeman, 2004; Learmonth, et al., 2006). Such modifications could cause ecosystem range shifts as the productivity of the regional ecosystem undergoes various changes related to nutrient inputs and coastal ocean processes (Doney et al., 2012; FWS, 2011b).

The Mid- and South Atlantic region has experienced more sea-level rise than the global mean, and this rate seems to be increasing (U.S. Climate Change Science Program [CCSP], 2009). High-intensity storms, coupled with higher sea levels, could increase coastal flooding and erosion, and degrade coastal habitats. For example, a loss of shoreline vegetation could occur from such storms. In addition, an increase in storms and sea-level rise may inundate and damage coastal and estuarine habitats, affecting nesting sea turtles, especially on barrier islands. If barrier islands continue to diminish, there would be more need for beach nourishment, which could potentially lead to increased species entrainment, especially of protected sea turtles, and increased turbidity of nearshore waters. Further, any changes to habitat would cause potential adverse impacts to marine mammals, sea turtles, fish resources, and other marine uses.

In 2011, the International Maritime Organization adopted mandatory technical and operational energy efficiency measures, which are expected to reduce the amount of CO_2 emissions from international shipping. While they have adopted those mandatory measures, we can still expect climate change impacts to accentuate and contribute to the overall cumulative impacts resulting from the proposed action, but that attributing those impacts to national activities is difficult because climate change impacts are global in nature and extent. Damages from climate change cannot be ascribed in any one particular source and atmospheric systems around the globe.

Ambient Ocean Noise

There are numerous sources of underwater noise. These sources include vessel noise from many activities, including shipping and marine transportation, and commercial and recreational fishing. Much of the increase in noise in the ocean environment is due to increased shipping as vessels become more numerous and of larger tonnage (Hildebrand, 2009b; McKenna et al., 2012; NRC, 2003; NMFS, 2018a). Shipping constitutes a major source of low-frequency sound in the ocean, particularly in the Northern Hemisphere where the majority of vessel traffic occurs. Also, vessel traffic is recognized as a major contributor to anthropogenic ocean noise, primarily in the low-frequency bands between 5 and 500 Hz (BOEM, 2014). Given the documented increases in marine transportation volumes along the U.S. Atlantic Coast, it is

expected that underwater noise from vessel traffic and other anthropogenic sources is increasing in the AOI (Jensen et al., 2009).

As discussed above, ambient sound in the Atlantic would have the potential to adversely impact marine mammals, sea turtles, fish resources, and other marine uses. The contribution of this cumulative IPF has been incorporated into the specific resource impact discussions and conclusions below.

Disease

Disease is common in many marine mammal populations and has been responsible for major die-offs worldwide, but such events are usually relatively short-lived. As described in the Atlantic G&G PEIS, bottlenose dolphins in the AOI experienced elevated strandings from 2013 to 2015, resulting in a UME event attributable to cetacean morbillivirus (NMFS, 2015). Morbillivirus can lead to death or secondary infections like skin lesions, pneumonia, brain infections, and other impacts. This UME has ended, but morbillivirus could reappear as a potential risk and it can spread to cetaceans through the eye, mouth, stomach, skin wounds, or sexual contact (NMFS, 2014). There are no other known diseases threatening marine mammals in the AOI at this time.

As discussed above, disease would only have the potential to adversely impact marine mammals, and the contribution of this cumulative IPF has been incorporated into the specific resource impact discussions and conclusions below.

3.7.2 Impact Analysis

3.7.2.1 Alternative 1

Marine Mammals

If Alternative 1 is selected, the proposed action would not occur and would not contribute incrementally to the other reasonably foreseeable actions and potential impacts on marine mammal species within the Atlantic OCS.

Sea Turtles

If Alternative 1 is selected, the proposed action would not occur and would not contribute incrementally to the other reasonably foreseeable actions and potential impacts on sea turtle species within the Atlantic OCS.

Fish Resources

If Alternative 1 is selected, the proposed action would not occur and would not contribute incrementally to the other reasonably foreseeable actions and potential impacts on fish and EFH within the Atlantic OCS.

Archaeological Resources

If Alternative 1 is selected, the proposed action would not occur and would not contribute incrementally to the other reasonably foreseeable actions and potential impacts on archaeological resources within the Atlantic OCS.

Other Marine Uses

If Alternative 1 is selected, the proposed action would not occur and would not contribute incrementally to the other reasonably foreseeable actions and potential impacts to other marine uses within the Atlantic OCS.

3.7.2.2 Alternative 2

Under Alternative 2, incremental cumulative impacts are expected to be similar as discussed under Alternative 3. The effects of the incremental contribution of Alternative 2, when viewed in combination with the effects associated with other relevant past, present, and future activities, could adversely impact marine mammals, sea turtles, fish and fisheries, archaeological resources and other marine uses in the Atlantic OCS. In Alternative 2, there could be direct and indirect effects to those resources identified (NARW primarily, and possibly other marine mammals, sea turtles, and fish). The cumulative impacts may be slightly higher when compared to Alternative 3 because no mitigation measures are proposed; however, overall because the proposed action is temporary and of a short duration, there is not a significant change to the overall level of cumulative impacts, and incremental cumulative impacts would be similar to Alternative 3 (discussion provided below).

3.7.2.3 Alternative 3

Marine Mammals

In addition to the proposed action, actions that may cause cumulative impacts to marine mammals are other G&G activities, vessel strikes, commercial and recreational fishing, interactive effects of climate change including impacts on preferred habitats and food sources, increases in ambient ocean noise, and disease.

Most cumulative impacts of increasing ambient noise are expected to be in the category of masking and behavioral responses rather than injury or threshold shifts. The biological significance of behavioral responses to underwater noise and the population consequences of those responses are not fully understood (NRC, 2005; Southall et al., 2007; Clark et al., 2009; Hildebrand, 2009a). The increased noise level may steadily erode marine mammals' abilities to communicate. At some point this anthropogenic noise could affect the abilities of whales to find food and mates (Clark et al., 2007). Increased noise can also lead to increased stress levels in some species. When animals frequently encounter stressful events (e.g., in particularly noisy areas), it could lead to – depending on the intensity – negative effects on critical functions such as reproduction, memory, immune response, and growth (Kleist et al., 2018; Wright et al., 2007).

Some of the underwater noise associated with the proposed action would be similar to the anthropogenic noise contribution considered under the cumulative scenario (e.g., vessel and equipment noise, sonars, and acoustic sources). This alternative would result in minor, temporary ambient noise level increases within the proposed area during G&G operations. Even though the amount of vessel noise and traffic would increase with surveys, the impacts are expected to be short term and localized.

Vessel strikes on NARWs and other species are expected to be avoided due to specified protocols in the Terms and Conditions of the Section 7 Consultation Under the Endangered Species Act: Programmatic G&G Activities in the Mid-Atlantic and South Atlantic Planning Areas from 2013 to 2020; Biological Opinion. Generally, NMFS believes that the likelihood of a vessel associated non-airgun HRG survey, which includes vibracoring, striking an ESA-listed cetacean or sea turtle is extremely low and discountable. Therefore, BOEM and NMFS agree that vessel traffic associated with non-airgun HRG surveys is not likely to adversely affect the ESA-listed cetaceans and sea turtles considered in the 2013 opinion.

Potential marine debris from the applicants' activities associated with this proposed action are not expected to cause increased exposure to marine mammals in the entire Atlantic Ocean and would be a minimal overall impact.

BOEM has determined that nothing in the Taylor permit application (or the other applications currently pending with BOEM) is likely to cause reduced fitness or impacts to biological resources that would have additive effects or make the species more susceptible to disease or worsen the effects of the disease.

Summary

The effects of the incremental contribution of Alternative 3, when viewed in combination with the effects associated with other relevant past, present, and future activities, could adversely impact marine mammals in the Atlantic OCS. Many natural and anthropogenic impacts can consistently interact with marine mammals, but the incremental contribution of the Taylor proposed action under Alternative 3 to cumulative impacts is expected to be **negligible** to **minor**.

Sea Turtles

Cumulative impacts to sea turtles are expected from cumulative G&G activity, vessel strikes, marine mineral use, commercial and recreational fishing, interactive effects of climate change including impacts on preferred habitats and food sources, and increases in ambient ocean noise.

As with marine mammals, sea turtles will not move towards a sound source that causes them stress or discomfort. Observational evidence suggests that sea turtles are not as sensitive to sound as are marine mammals, and behavioral changes are only expected when sound levels rise above received sound levels of 175 dB re: 1 µPa (rms). Few studies have examined the role that acoustic cues play in the ecology of sea turtles, and little is known about the extent to which they depend upon their auditory environment. However, sea turtles may experience behavioral disturbance or acoustic masking due to increased ambient noise. Avoidance responses to seismic signals have been observed, so it is known that sea turtles can detect and respond to low-frequency sound. Sea turtles appear to be low-frequency specialists, and thus the potential masking noises would fall within at least 50-1,000 Hz. However, masking is not expected to affect sea turtles since they are not known to rely heavily on acoustics for life functions (Nelms et al., 2016; Popper et al., 2014).

Vessel strikes are a poorly studied threat to sea turtles (Work et al., 2010). Although sea turtles can move somewhat rapidly, they are still vulnerable to strikes from vessels that are moving at more than 4 km/hr (2.5 mph), which is common in open water (Hazel and Gyuris, 2006; Hazel et al., 2007; Work et al., 2010). 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). The incremental contribution of impacts from vessel strikes associated with the proposed action on sea turtles are expected to be avoided due to (1) the guidelines for vessel strike avoidance that would be part of all authorizations for shipboard surveys under the proposed action and (2) the typically slow speed of survey vessels. No vessel strikes are expected for sea turtles.

In addition, dredging activities from marine mineral use can increase acoustic noise, turbidity, and entrain, injure, or kill sea turtles (CSA International et al., 2010). Required mitigation measures aim to decrease entrainment risk and impacts for protected sea turtles. Marine minerals dredging is expected to continue or increase, so the risk of entrainment (particularly of sea turtles) may follow this trend.

Commercial fishing operations often use equipment that may entangle sea turtles, be ingested, or disturb the seafloor. For example, longline fishing practices, which typically target pelagic species, unintentionally hook sea turtles, sometimes killing them. Vertical lines for lobster and crab pots pose an entanglement risk for various marine species, including sea turtles. Sea turtles have been subject to entanglement injuries over the years. Prior to regulations, it is estimated that 71,000 sea turtles were killed annually as bycatch (Finkbeiner et al. 2011). Mortality rates have decreased since the implementation of regulations, but because turtles mature slowly, populations are still recovering. Similar to commercial fishing, recreational fishing also results in increased marine traffic and resource consumption. Fishing line and gear that is not disposed of properly can create hazards to sea turtles.

Climate change is global in nature and is assumed to continue a currently unknown overall shift in marine populations spatially and temporally. Though this could impact sea turtles, the timeframe for drastic changes in populations due to climate change is expected to be drawn out.

Potential marine debris from the applicant's activities associated with this proposed action are not expected to cause increased exposure of persistent organic pollutants to sea turtles uses in the entire Atlantic Ocean and would be a minimal overall impact.

Summary

The effects of the incremental contribution of Alternative 3, when viewed in combination with the effects associated with other relevant activities, could adversely impact sea turtles in the Atlantic OCS. Many natural and anthropogenic impacts can consistently interact with sea turtles, but the incremental contribution of the Taylor proposed action under Alternative 3 to the cumulative impact is expected to be **negligible** to **minor**.

Fish Resources

Cumulative impacts to fish are expected from G&G activities, commercial and recreational fishing, climate change, and increases in ambient ocean noise.

It is expected that environmental degradation from noise from G&G activities and non-OCS activities could affect fish populations; however, the incremental contribution of the proposed action to these cumulative impacts would be **negligible** due to the short-term and localized effects generated as the vessels transit through an area. Commercial and recreational fishing continues to evolve with new regulations through the Fisheries Councils and NMFS, so those impacts would continue but at a reduced capacity. Climate change is global in nature and is assumed to continue a currently unknown overall shift in marine populations spatially and temporally. Though this could impact fish and EFH, the timeframe for drastic changes in populations due to climate change is expected to be drawn out. BOEM has determined that the Taylor proposed survey will have no effect on EFH; there is no incremental contribution to other cumulative activities' effect on EFH that would lead to additional impacts to fish resources.

Potential marine debris from the applicants' activities associated with this proposed action are not expected to cause increased exposure of persistent organic pollutants to fish resources uses in the entire Atlantic Ocean and would be a minimal overall impact.

Summary

The effects of the incremental contribution of Alternative 3, when viewed in combination with the effects associated with other relevant activities, may impact fish and fisheries occurring in the Atlantic. Many natural and anthropogenic impacts can consistently interact with fish and fisheries but the incremental contribution of the Taylor proposed action under Alternative 3 to the cumulative impact is expected to be **negligible**.

Archaeological Resources

In addition to the proposed action, actions that may cause cumulative impacts to archaeological resources are any activities that have potential bottom disturbing impacts, including other G&G activities, marine minerals use, military operations, shipping and marine transportation, commercial and recreational fishing, sport diving, commercial treasure hunting, tropical storms, and marine trash and debris.

As described above, any bottom disturbing activities have the potential to disturb or destroy diagnostic artifacts and the provenience of archaeological data. The destruction and loss of this data eliminates the ability of the archaeologist to fully and accurately detail activity areas found at the site, variation and

technological advances lost to history, the age, function, and cultural affiliation of the archaeological site, and its overall contribution to understanding and documenting the maritime heritage and culture of the region. Additionally, the loss or discard of debris associated with fishing or other maritime activities could result in the masking of historic shipwrecks or the introduction of false targets that could be mistaken in the remote sensing record as historic resources.

Summary

The effects of the incremental contribution of Alternative 3, when viewed in combination with the effects associated with other relevant activities, could adversely impact archaeological resources in the Atlantic OCS. Many natural and anthropogenic impacts can consistently interact with archaeological resources, but the incremental contribution of the Taylor proposed action under Alternative 3 to the cumulative impact is expected to be **negligible**.

Other Marine Uses

Cumulative impacts to other marine uses are expected from cumulative G&G activity, marine minerals use, renewable energy development, commercial and recreational fishing, climate change, military operations, and shipping and marine transportation.

All authorizations for permitted activities would include guidance for military and NASA coordination. Vessel and aircraft operators would be required to establish and maintain early contact and coordination with the appropriate military command headquarters or NASA point of contact. DOD/BOEM Interagency Working Groups have been formed specifically to address potential conflicts of BOEM-permitted G&G surveys and DOD operations in the Atlantic.

The incremental contribution of the proposed action to cumulative impacts to other marine uses is expected to be **negligible** due to the temporary and short-term effects generated from the proposed survey activities. The Requirement for a Local Notice to Mariners is expected to minimize the potential for multi-use conflicts in the proposed survey area. Additionally, although BOEM does not expect all proposed G&G seismic surveys to be operating concurrently at any time when the proposed action is currently taking place, it is still expected that there would be a negligible increase of direct or indirect impacts to other marine uses because the proposed action is temporary in nature and of relatively short duration at a specific location and/or time. As previously noted, no significant cumulative impacts on other marine use resources would be expected as a result of the proposed activities when added to the impacts of past, present, or reasonably foreseeable activities in the area of the proposed action.

The increase in the potential for accidental fuel spills arising from vessel collisions between shipping vessels and G&G vessels during G&G activities is considered to be extremely small. The impacts associated with the proposed action and the low probability of a G&G survey activity-related fuel spill would result in a slight incremental increase in impacts under the cumulative scenario, resulting in only **negligible** incremental impacts to marine mammals, sea turtles, fish resources, and other marine uses.

Climate change is global in nature and is assumed to continue a currently unknown overall shift in marine populations spatially and temporally. Though this could impact sea turtles, the timeframe for drastic changes in populations due to climate change is expected to be drawn out.

Potential marine debris from the applicants' activities associated with the proposed action are not expected to cause increased exposure of persistent organic pollutants to other marine uses in the entire Atlantic Ocean and would be a minimal overall impact.

Summary

The effects of the incremental contribution of Alternative 3, when viewed in combination with the effects associated with other relevant activities (i.e., renewable energy development, marine minerals use, military operations, shipping and marine transportation, and commercial and recreational fishing), may impact other marine uses occurring in the Atlantic. With the implementation of the coordination activities described in **Chapter 3.5.2**, the effects of these combined activities would be regulated to minimize potential cumulative impacts. As a result of these coordination efforts and given the scope of the proposed action, incremental effects from the proposed vibracoring activities on other marine uses would be **negligible** to **minor**.

The effects of the incremental contribution of Alternative 3, when viewed in combination with the effects associated with other relevant past, present, and future activities, could adversely impact marine mammals, sea turtles, fish and fisheries, and other marine uses in the Atlantic OCS. In Alternative 3, there could be a minor reduction in direct and indirect effects to those resources identified (NARW primarily, and possibly other marine mammals, sea turtles, and fish); if anything, the incremental contribution would also be reduced slightly, though in many cases it may not even be discernible from other sources. The incremental contribution to the cumulative impacts remain **negligible** to **minor** for Alternative 3.

4 CONSULTATION AND COORDINATION

Coastal Zone Management Consultation

In advance of operations, the operator shall communicate the project area and timing to the State-appointed point of contact for the CZMA State to afford the State an opportunity to coordinate with other stakeholders and minimize, to the extent practicable, reasonably foreseeable effects to CZMA State coastal uses and resources. The operator shall also provide, to each of the aforementioned State-appointed CZMA point of contacts, written notification in advance of commencement and completion of all survey operations within their State's offshore administrative boundaries. Per 15 CFR § 930 subpart D, private activities that require a Federal permit or license must be "fully consistent" with enforceable policies of the State's coastal management program. The Florida Department of Environmental Protection issued a letter on November 28, 2018 to Taylor stating that they did not object to this project.

Endangered Species Act

The Endangered Species Act of 1973 (ESA) (16 U.S.C. §§ 1631 *et seq*.), as amended (43 U.S.C. §§ 1331 *et seq*.), establishes a national policy designed to protect and conserve threatened and endangered species and the ecosystems upon which they depend. NMFS completed a formal programmatic (covers all three BOEM programs) consultation with BOEM in 2013. Terms and Conditions were defined and must be followed as per the 2013 BO. These include mitigation measures specifically for G&G activities (including non-airgun HRG, which includes vibracoring) associated with MMP activities. The Programmatic G&G ESA Section 7 consultation was reinitiated in October 2015 and the conditions analyzed in the Atlantic G&G PEIS and ROD are consistent with the amended Biological Assessment submitted for the October 2015 reinitiated consultation[3]. The Revised BO is not expected to significantly modify or add to the mitigation and monitoring measures analyzed in the Atlantic G&G PEIS and ROD. If there are any changes to or additional terms and conditions required in a Revised BO, they would be expected to further reduce any potential impacts to species evaluated in the Atlantic G&G PEIS, and could be addressed through site specific analyses, if applicable.

[3] At the time of reinitiation for the July 2013 Atlantic G&G BO all three program areas (oil and gas, renewable energy, and marine minerals) were included. During the reinitiation consultation process, BOEM and NMFS decided to separate the programmatic consultation into three separate consultations. For the three separate programmatic consultations, marine minerals action area extends to federal waters 50 m (164 ft) deep, renewable energy in federal waters to 100 m (328 ft) deep, and oil and gas action includes all areas of the Mid and South Atlantic Planning Areas.

In August 2018, BOEM published the Draft MMP EA. The purpose of this NEPA document is to describe and evaluate the potential environmental impacts related to G&G survey activities to support identification, mapping, monitoring, and research of sand resources in the Atlantic and GOM OCS regions. The MMP EA provided an analysis to determine whether significant impacts on Atlantic and GOM resources could occur as a result of the proposed sand survey activities and specifies mitigation measures that would be implemented to avoid, reduce, or minimize impacts.

BOEM initiated informal consultations with NMFS and United States Fish and Wildlife Service (USFWS) pursuant to Section 7 of the ESA and implementing regulations (50 CFR 402) for Federal actions proposed in the MMP EA. BOEM determined that the proposed action will have no effect or is not likely to adversely affect listed species and their critical habitats. The MMP EA was used to support informal Section 7 consultations in lieu of preparing a separate Biological Assessment.

USFWS provided concurrence with BOEM's determination that G&G surveys for sand resources may affect, but are not likely to adversely affect the West Indian Manatee on October 10, 2018. USFWS reviewed and agreed with BOEM's "No Effect" determination for other species; however, "No Effect" determinations are the Action Agency's call and do not need to be formally reviewed or official concurred by either USFWS or NMFS.

NMFS initiated consultation on December 7, 2018, but consultation was held in abeyance for 38 days due to a lapse in appropriations and resulting partial government shutdown. Consultation resumed on January 28, 2019. NMFS concurred with BOEM's determination that G&G activities proposed in the MMP EA would have "No Effect" on blue whales, elkhorn and staghorn corals and their designated critical habitat, and critical habitat designated for loggerhead sea turtles, Gulf sturgeon, smalltooth sawfish, and NARW. NMFS determined "May Affect" finding and the definition of "discountable effects" (i.e., effects are "extremely unlikely to occur") for fin, sei, and sperm whales, and DPS of Atlantic sturgeon, Gulf of Maine DPS of Atlantic salmon, Gulf Sturgeon, giant manta ray, smalltooth sawfish, oceanic whitetip shark, and Nassau grouper. NMFS determined may affect, but is not likely to adversely affect NARW, loggerhead sea turtles, green sea turtles, Kemp's ridley, leatherback sea turtles, or hawksbill sea turtles.

Marine Mammal Protection Act

Mitigation measures are included in this SEA to ensure the least practicable adverse impacts on marine mammal species to ensure that potential impacts to marine mammal populations will be negligible and have no unmitigatable adverse impacts. A detailed description of the mitigation and monitoring measures are provided in **Appendix A.** Taylor must contact NMFS to determine if an Incidental Harassment Authorization (IHA), pursuant to Section 101(a)(5) of the MMPA is necessary prior to beginning their survey activities. Confirmation of the communications between Taylor and NMFS must also be received by BOEM prior to Taylor beginning their survey activities.

Government-to-Government

Executive Order 13175, signed on November 6, 2000, directs Federal agencies to establish regular and meaningful consultation and collaboration with Tribal officials in the development of Federal policies that have Tribal implications to strengthen the U.S. government-to-government relationships with Indian Tribes and to reduce the imposition of unfunded mandates upon Indian Tribes.

While there are no Indian Tribal government lands on the Atlantic OCS, BOEM recognizes that the proposed action, and its potential impacts, may be of interest to Indian Tribes with current or historic affiliation to resources in the AOI. Since implementation of Executive Order 13175, the U.S. Department of the Interior has established a Tribal Consultation Policy (per Secretarial Order 3317) and BOEM has issued its own guidance implementing the Department's policy. In accordance with the intent and letter of

these policies and directives, BOEM has reached out to federally recognized Indian Tribes regarding G&G activities on the Atlantic OCS.

BOEM previously engaged with Atlantic-affiliated Indian Tribes during preparation of the Atlantic G&G PEIS. Formal letters were sent during the preparation of the Atlantic G&G PEIS in March 2012 and December 2013, and again in September 2014 following the publication of the ROD. No requests to enter into consultations were received in response to those communications.

Under the MMP EA, BOEM noted it has conducted multiple Government-to-Government consultations for BOEM activities along the Atlantic OCS. Recent consultations for renewable energy, included G&G survey activities for that program area. The information obtained during those consultations, are consistent with those implemented for MMP activities. In addition, BOEM consulted with Federally-recognized tribes, state-recognized tribes prior to conducting G&G activities identical to the ones discussed in the MMP EA, but for the purposes of identifying potential sand resources for beach nourishment and coastal restoration projects directly related to Hurricane Sandy recovery.

Federally-Recognized Tribes (in Alphabetic Order): Absentee Shawnee Tribe of Oklahoma; Alabama-Coushatta Tribe of Texas; Aroostook Band of Micmacs; Caddo Nation of Oklahoma; Catawba Indian Nation; Cayuga Nation; Cherokee Nation; Chitimacha Tribe of Louisiana; Coushatta Tribe of Louisiana; Choctaw Nation of Oklahoma; The Delaware Nation - Anadarko; The Delaware Nation - Bartlesville; The Delaware Nation - Emporia; Eastern Band of Cherokee Indians; The Eastern Shawnee Tribe of Oklahoma; Houlton Band of Maliseet Indians; Jena Band of Choctaw Indians; Mashantucket Pequot Tribe of Connecticut; Mashpee Wampanoag Tribe; Miccosukee Tribe; Mississippi Tribe of Choctaw Indians; Mohegan Indian Tribe of Connecticut; Muscogee (Creek) Nation; Narragansett Indian Tribe; The Oneida Indian Nation; Onondaga Nation; Passamaquoddy Tribe - Indian Township; Passamaquoddy Tribe - Pleasant Point; Penobscot Nation; Poarch Band of Creek Indians; Saint Regis Mohawk Tribe; Seminole Nation of Oklahoma; Seminole Tribe of Florida; Seneca Nation of New York; Shinnecock Indian Nation; Stockbridge-Munsee Community of Mohican Indians; Tonawanda Band of Seneca Indians; Tunica-Biloxi Tribe of Louisiana; Tuscarora Nation; United Keetoowah Band of Cherokee Indians in Oklahoma; and Wampanoag Tribe of Gay Head (Aquinnah).

BOEM received concurrences from five tribal governments. BOEM received no other responses from tribal governments for renewable energy or Hurricane Sandy recovery G&G type activities. BOEM plans and continues future engagement and outreach with tribal nations and governments, which includes G&G activities.

Essential Fish Habitat

A programmatic essential fish habitat assessment was prepared by BOEM in accordance with the requirements of Section 305 (b)(2) of the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) in the MMP EA (BOEM, 2018). The consultation was completed with a concurrence letter from NMFS to BOEM dated November 20, 2018. NMFS, in general, concurs with the determination that impacts to EFH as a result of sand survey work will be negligible to minor. NMFS recommends further research on the effects of sand survey activities on the acoustic effects on fish. NMFS also recommended continued coordination with the federal fisheries management councils to identify sensitive areas where survey activities should be avoided. NMFS assigned smalltooth sawfish conditions which were incorporated into permit mitigation measures.

The short-term, localized elevation of noise levels associated with survey vessels and equipment are expected to have a short-term localized impact on the behavior of fishes near the source and no impact on benthic communities. Although an accident could result in a small quantity of spilled fuel and the deposition of debris on the seafloor, due to the small size of an accidental spill and the rapid volatilization

expected for light fuel components, there would be **negligible** expected impacts to fishes and benthic communities, and no effects to EFH.

National Marine Sanctuaries

Under the Marine Protection, Research, and Sanctuaries Act of 1972 (also known as the National Marine Sanctuaries Act, or NMSA), NOAA establishes as NMSs those areas of the marine environment with special conservation, recreational, ecological, historical, cultural, archaeological, scientific, educational, or aesthetic qualities. Sanctuary regulations prohibit destroying, causing the loss of, or injuring any sanctuary resource managed under the law or regulations for that sanctuary (15 CFR § 922).

NMSs are managed on an activity-specific basis, and each sanctuary has site-specific regulatory prohibitions. Additionally, Section 304(d) of NMSA requires Federal agencies to consult with NOAA's Office of National Marine Sanctuaries whenever their proposed actions are likely to destroy, cause the loss of, or injure a sanctuary resource.

There are no NMS within the AOI and no impacts would occur; therefore, the impacts will be negligible and consultation is not required.

Military Coordination

All authorizations for permitted activities include guidance for military coordination. All vessel operators and contractors actively engaged in G&G surveys and permitted activities as a stipulation measure are required to establish and maintain early contact and coordination with the appropriate military range complex or command headquarters in order to avoid or minimize conflicts with potentially hazardous military operations.

Depending on the time and place for the activity, the vessel operator may be required to enter into a formal Operating Agreement that delineates the specific requirements and operating parameters for the proposed activities when determined necessary by military contacts.

Appendix A

Mitigation Measures

Mitigation Measures

- **VIBRACORE SAMPLING PROTOCOL:**

  Only vibracorers will be used to sample near-surface sediments. The vibratory mechanism on the vibracore will be the primary source of underwater sound during geological sampling operations in addition to broadband noise from the vessel. The vibrahead will not be operated until the vibracore platform makes contact with the seabed and the core barrel makes contact with the seafloor. The vibrahead will not be operated when the vibracore platform is being retrieved.

1. An acoustic exclusion zone will be monitored during survey activities. The acoustic exclusion zone will be a 328-ft (100-m) radius zone around the sound source.
2. Operations will be monitored by a National Marine Fisheries Service (NMFS)-approved, trained protected species observer (PSO). At least one PSO will be required aboard sand survey vessels at all times during daylight hours (dawn to dusk – i.e., from about 30 minutes before sunrise to 30 minutes after sunset) when survey operations are being conducted, including during conditions (e.g., fog, rain, darkness) that adversely affect the effectiveness of sea surface observations. If conditions deteriorate during daylight hours such that the observations are not possible, visual observations will resume as soon as conditions permit. Ongoing activities may continue, but they may not be initiated under such conditions (i.e., without appropriate pre-activity monitoring).
3. Visual monitoring of acoustic exclusion zones will be conducted by searching the area around the vessel using hand-held reticle binoculars and the unaided eye to observe and document the presence and behavior of marine mammals and sea turtles. PSOs may be trained third-party observers, crew members trained as observers, or a combination of both trained third-party and crew observers. PSOs will be solely dedicated to perform visual observer duties. PSOs shall operate under the following guidelines:

   a. Other than brief alerts to make personnel aware of maritime hazards, no additional duties shall be assigned to observers during their watch.

   b. A watch shall be no longer than six continuous hours. Consequently, at least two PSOs will be required on board vessels to monitor the acoustic exclusion zone when daily survey activities exceed 6 hours.

   c. A break of at least 2 hours shall occur between 6-hour watches; no other duties shall be assigned during this period.
4. When operating during reduced visibility, observers will monitor the waters around the acoustic exclusion zone using shipboard lighting and enhanced vision equipment.
5. Start-up and shut-down requirements: The acoustic exclusion zone for sound sources shall be monitored for all marine mammals and sea turtles for no less than 30 minutes prior to start-up and continue until operations cease. Immediate shutdown of the sound source would occur if any non-delphinid cetacean is detected entering or within the acoustic exclusion zone. Immediate shutdown of the sound source would occur if any sea turtle is detected entering or within the acoustic exclusion zone. Subsequent restart of the equipment may only occur following a confirmation that the exclusion zone is clear of all marine mammals and sea turtles for 30 minutes.
6. Shutdown of sound sources will not be required for delphinids approaching the vessel (or vessel's towed equipment) that indicates a "voluntary approach" on behalf of the animal. A "voluntary approach" is defined as a clear approach toward the vessel by the animal(s) with a vector that

indicates that it is approaching the vessel and remains near the vessel or deployed equipment. The intent of the animal(s) would be subject to the determination of the PSO. If the PSO determines that the animal(s) is actively trying to avoid the vessel or the towed equipment, the acoustic sources must be immediately shutdown. The PSO must record the details of any non-shutdowns in the presence of a delphinid, including the distance of the animal(s) from the vessel at the first sighting, heading, position relative to the vessel, duration of sighting, and behavior.

7. Referencing Consultation PCTS NER-2018-15093, BOEM will notify via email Julie Crocker at NMFS NERO (Julie.Crocker@noaa.gov) and NMFS SERO at least 30 days in advance of the start of the proposed activity and indicate the proposed action is consistent with the activities and conditions previously consulted on.
8. Data on all marine mammal and sea turtle observations must be recorded by the observer based on standard observer data collection protocols. This information must include the following:
    a. vessel name;
    b. observers' names, affiliations, and resumes;
    c. date;
    d. time and latitude/longitude when daily visual survey began;
    e. time and latitude/longitude when daily visual survey ended; and
    f. average environmental conditions during visual surveys including
        i. wind speed and direction;
        ii. sea state (glassy, slight, choppy, rough, or Beaufort scale);
        iii. swell (low, medium, high, or swell height in meters); and
        iv. overall visibility (poor, moderate, good).
    g. species (or identification to lowest possible taxonomic level);
    h. certainty of identification (sure, most likely, best guess);
    i. total number of animals;
    j. number of calves and juveniles (if applicable/distinguishable);
    k. description (as many distinguishing features as possible) of each individual seen, including length, shape, color and pattern, scars or marks, shape and size of dorsal fin, shape of head, and blow characteristics.
    l. whether or not a shutdown was required;
    m. direction of animal's travel relative to the vessel (drawing preferable);
    n. behavior (as explicit and detailed as possible; note any observed changes in behavior); and
    o. activity of vessel when sighting occurred.
9. BOEM will require the surveyor to prepare and submit a monthly report that summarizes the survey activities and an estimate of the number of listed marine mammals, sea turtles, and any other protected species observed during these survey activities. The report should be submitted to BOEM Regional Supervisor, Office of Resource Evaluation, DASPU and Deena Hansen, Marine Minerals Program (Deena.Hansen@boem.gov).

- **VESSEL STRIKE AVOIDANCE PROTOCOL:**

All activities (including vessel transit) will be required to comply with the following requirements:

1. Vessel operators, crews, and visual observers or PSOs must maintain a vigilant watch for marine mammals, sea turtles, and protected fish (e.g., sturgeon and smalltooth sawfish), and slow down or

stop their vessel regardless of vessel size to avoid striking protected species. A visual observer aboard all survey vessels will monitor an area around a transiting survey vessel, the vessel strike exclusion zone, to ensure that it is free of marine mammals, sea turtles, and protected fish. At least one observer will be required aboard all vessels. Visual observers, for the purpose of vessel strike, may be third-party or not third-party, but require training. In addition, vessel operators would be required to comply with NMFS marine mammal and sea turtle viewing guidelines for a region.

2. In accordance with NMFS' "Compliance Guide for the Right Whale Ship Strike Reduction Rule" (50 CFR § 224.105 and 78 FR 73726–73736), when safety allows, vessels, regardless of size, shall transit within the 10-knot (kn) (18.5-kilometer/hour [km/h]) speed restriction in North Atlantic right whale DMAs, Northeast critical habitat and SMAs, mid-Atlantic SMAs, and critical habitat and southeast SMAs at the appropriate times:

Seasonal Management Area	**Effective Dates**
Northeast Feeding Areas	
Cape Cod Bay SMA	Jan 1 – May 15
Off Race Point SMA	Mar 1 – Apr 30
Great South Channel SMA	Apr 1 – Jul 31
Mid-Atlantic Migratory Route	
Port and vessel route areas from Block Island, RI to Savannah, GA	Nov 1 – Apr 30
Southeast Calving and Nursery Grounds	
South GA to North FL	Nov 15 – Apr 15
SMA maps and coordinates: https://www.greateratlantic.fisheries.noaa.gov/shipstrike/doc/compliance_guide.pdf	

When safety permits, vessel speeds should also be reduced to 10 kn (18.5 km/h) or less when mother/calf pairs, pods, or large assemblages of right whales are observed near a transiting vessel. A single animal at the surface may indicate the presence of submerged animals in the vicinity of the vessel; therefore, precautionary measures should be exercised when an animal is observed. Mandatory reductions in speed will also limit continuous noise levels related to propeller cavitation and hull-wave interaction.

3. When North Atlantic right whales are sighted at any time during the year, vessels, regardless of size, must maintain a minimum separation distance of 1,640 ft (500 m). The following avoidance measures must be taken if a vessel comes within 1,640 ft (500 m) of a right whale:

   a. While underway, the vessel operator shall steer a course away from the right whale at 10 kn (18.5 km/h) or less until the minimum separation distance has been established.

   b. If a right whale is spotted in the path of a vessel or within 328 ft (100 m) of a vessel underway, the operator shall reduce speed and shift engines to neutral. The operator shall only re-engage engines after the right whale has moved out of the path of the vessel and is more than 328 ft (100 m) away. If the right whale is still within 1,640 ft (500 m) of the vessel, the vessel shall select a course away from the whale's course at a speed of 10 kn (18.5 km/h) or less. This procedure shall also be followed if a right whale is spotted while a vessel is stationary.

Whenever possible, a vessel should remain parallel to the whale's course while transiting, avoiding abrupt changes in direction until it has left the area.

4. Vessels, regardless of size, must maintain a minimum separation distance of 328 ft (100 m) year-round if whales other than right whales, seals, or manatees are sighted. The survey will comply with other relevant manatee construction conditions when operating within the species' range. All vessels will follow routes of deep water whenever possible. Year-round, vessels, regardless of size, shall maintain a distance of 164 ft (50 m) or greater from delphinid cetaceans. If encountered during transit, a vessel shall attempt to remain parallel to the animal's course, avoiding excessive speed or abrupt changes in course.
5. All vessels, regardless of size, must maintain a distance of 164 ft (50 m) or greater if sea turtles or other protected species are sighted, whenever possible. Engines will not be re-engaged until the animals are clear of the 50-m (164-ft) exclusion area. The survey will comply with other relevant smalltooth sawfish construction conditions when operating within the species range. During nighttime geophysical surveys and transit, nighttime observer requirements will be implemented and vessel speed will not exceed 5 kn (9.3 km/hr) in areas where sea turtles are most likely to be present.
6. The applicant must provide a text message address (that is capable of receiving short emails as text messages) to receive real-time whale alerts throughout the calving season. The text message must be provided to nmfs.ser.rw.subscribe@noaa.gov at least 14 days prior to the start of work.
7. Sightings of any injured or dead protected species must be reported to BOEM and NMFS SERO or the U.S. Fish and Wildlife Service Field Office within 24 hours, regardless of whether the injury or death was caused by their vessel.

- **MARINE MAMMAL PROTECTION ACT COORDINATION:**

  The applicant should independently determine if an Incidental Take Authorization must be obtained for the planned activities. The applicant may contact NMFS, Permits and Conservation Division, Office of Protected Resources, 1315 East-West Highway, F/PR1 Room, 13805, Silver Spring, Maryland, 20910 (Jolie.Harrison@noaa.gov) for additional information regarding Marine Mammal Protection Act compliance.

- **SEA TURTLE AND SMALLTOOTH SAWFISH CONDITIONS:**

  The full suite of mitigation measures typically applied to minimize impacts to sea turtles and sawfish during "construction activities" are available online: (https://sero.nmfs.noaa.gov/protected_resources/section_7/guidance_docs/documents/sea_turtle_and_smalltooth_sawfish_construction_conditions_3-23-06.pdf).

  In addition to aforementioned reporting requirements for all protected species interactions, injury or mortality, or other observations, the following mitigation measures are also required during geophysical surveying and geological sampling:

  1. All personnel shall be alerted to the potential presence and need to avoid sea turtles and smalltooth sawfish, as well as the fact that there are penalties for harming, harassing, or killing these species.
  2. All vessels shall operate at "no wake/idle" speeds while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.
  3. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a

sea turtle or smalltooth sawfish. Operation of any mechanical equipment (e.g., vibracores) shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

- **MARINE POLLUTION CONTROL PLAN:**

  All survey activities will occur under a marine pollution control plan developed by the surveyor. The marine pollution control plan must address the marine debris awareness requirement. The surveyor must prepare for and take all necessary precautions to prevent discharges of waste or hazardous materials that may impair water quality. Sufficient spill response equipment and supplies shall be available onboard (or readily mobilized with a secondary vessel) to contain and recover the maximum scenario spill keyed to the proposed operations and disclosed in the marine pollution control plan. In the event of such an occurrence, notification and response will be in accordance with applicable requirements of 40 CFR part 300. All vessel operations must be compliant with USCG regulations and the U.S. Environmental Protection Agency's (USEPA) Vessel General Permit, as applicable. BOEM, USCG, and USEPA, as necessary, will be notified of a noncompliant discharges and remedial actions taken. Reports of the incident and resultant actions will be provided to BOEM.

  As an additional measure to reduce the likelihood of accidental spills, vessel fueling will only occur in-port at a docking facility; no at-sea cross-vessel fueling will be permitted.

- **MARINE DEBRIS AWARENESS PROGRAM:**

  All participants in survey activities will be educated on marine trash and debris awareness elimination. The surveyor would be required to ensure that its employees and subcontractors are made aware of the environmental and socioeconomic impacts associated with marine trash and debris and their responsibilities for ensuring that trash and debris are not intentionally or accidentally discharged into the marine environment where it could affect protected species.

  The deliberate discharge of containers and other similar materials (i.e., trash and debris) into the marine environment is prohibited, and durable identification markings on equipment, tools, containers (especially drums), and other materials are required. Furthermore, the intentional jettisoning of trash has been the subject of strict laws such as the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex V and the Marine Plastic Pollution Research and Control Act (MPPRCA), as well as regulations imposed by various agencies such as USCG and USEPA.

- **NAVIGATION AND COMMERCIAL FISHERIES OPERATIONS CONFLICT MINIMIZATION REQUIREMENTS:**

  Notification of pending activities will be made in the USCG Local Notice to Mariners no less than 48 hours prior to the commencement of all sand survey activities. The call sign of the survey vessel and preferred communication channel must be identified.

  Consistent with applicable USCG regulations, all designated vessels will be equipped with Automatic Information System (AIS) and broadcast vessel's identity, type, position, course, speed, and navigational status during surveying activities. BOEM will require any vessel greater than 65 ft (20 m), regardless of operational status, to employ an AIS system.

  Vessels will "fly" the appropriate USCG-approved day shapes (mast head signals used to communicate with other vessels) and display the appropriate lighting during daylight and any nighttime operations to designate the vessel has limited maneuverability.

  To minimize interaction with fishing gear that may be present, the survey operator will traverse or visually scan the general survey area, or use other effective methods, prior to commencing survey

operations to determine the presence of deployed fishing gear. Observed fishing gear must be avoided by a minimum of 100 ft (30 m). Fishing gear must not be relocated or otherwise disturbed.

- **ADVANCE NOTIFICATION OF SURVEY ACTIVITIES IN MILITARY WARNING AND TEST AREAS AND NASA OPERATING AREAS:**

  The Atlantic OCS Region is used extensively by the U.S. Department of Defense and NASA for conducting various mission operations, including air-to-air gunnery, rocket and missile research and testing, sonar buoy operations, pilot training, and aircraft carrier operations. To ensure personnel safety and to reduce the likelihood of conflicts between military operations and any geophysical and geological surveying in military warning or test areas, notification to and coordination with the relevant Naval or Air Force military commands is required at least 7 days in advance of commencing survey activities. Additionally, advance notification of all survey activities planned in any military warning or test areas, regardless of scope or duration, must be made in the USCG Local Notice to Mariners no less than 72 hours prior to the commencement of all survey activities. The call sign of the survey vessel and preferred communication channel must be identified.

- **HISTORIC AND PRE-CONTACT SITES AVOIDANCE AND REPORTING REQUIREMENTS:**

  1. BOEM will require advance site-specific information, including sub-bottom, side-scan sonar, or multibeam/swath backscatter of equivalent resolution, and magnetometer data collected under authorization E18-005, to determine the presence of potential archaeological resources prior to undertaking any seafloor-disturbing activities. BOEM will use this information to ensure that physical impacts on archaeological resources would not take place. The surveyor must provide to BOEM a determination by a Qualified Marine Archaeologist as to whether any potential archaeological resources are present in the surveyed area. A Qualified Marine Archaeologist must meet the Secretary of the Interior's Professional Qualifications Standards for Archaeology (48 FR 44738- 44739); must have demonstrable, professional experience in interpretation of marine geophysical data; and must demonstrate familiarity/experience with the archaeology of the Study Area.

  2. Prior to beginning the proposed vibracoring activities, a review of the high resolution geophysical (HRG) data collected under authorization E18-005 must also be conducted by a BOEM archaeologist. Submit the HRG data to BOEM Regional Supervisor, Office of Resource Evaluation, Data Acquisition and Special Projects Unit (DASPU) at least 30 days prior to commencing activities proposed in application E18-005.

  3. Before seafloor sampling is conducted, a geological sampling plan will be submitted to BOEM. All sampling must occur within the effective coverage of geophysical data.

  4. All geological sampling must avoid potential archaeological resources by a minimum of 164 ft (50 m). All associated anchoring, if any, must avoid potential archaeological resources by 328 ft (100 m). The avoidance distance must be calculated from the maximum discernible extent of the archaeological resource. During vibracoring, vibracore penetration rates will also be monitored to help ensure minimum sampling in geologic units not indicative of surface sands. The cores should be placed to avoid impacting any relict Pleistocene landforms identified in the E18-005 subbottom profiler data that could have potential to retain intact prehistoric archaeological resources. If avoidance of these areas is not possible, further coordination with BOEM will be required to discuss alternatives prior to conducting the proposed operations.

5. Surveyors will report suspected historic and pre-contact archaeological resources to BOEM and take necessary precautions to protect said resources. BOEM will also require reporting and avoidance for any previously undiscovered suspected archaeological resource and precautions to protect the resource from seafloor-disturbing activities. Undiscovered archaeological resources could include items such as a shipwreck (e.g., a sonar image or visual confirmation of an iron, steel, or wooden hull, wooden timbers, anchors, concentrations of historic objects, piles of ballast rock) or pre-contact artifacts within the Study Area. If the surveyor discovers any archaeological resource while conducting operations, operations that could continue to affect the discovery must be immediately halted and the discovery reported to BOEM Regional Supervisor of the Environment within 24 hours. Operations must cease within 1,000 feet (305 meters) of the site until the Regional Director provides further instruction on what steps must be taken to protect the site and assess its potential historic significance. In the event that the seafloor-disturbing activities impact potential historic properties, the operator and Qualified Marine Archaeologist who prepared the report must provide a statement documenting the extent of these impacts to BOEM within 24 hours.

6. Following completion of sampling, as-placed coring locations of all cores must be submitted relative to any historical, biological or geological objects identified in the HRG survey. The map and corresponding data should be submitted to DASPU within 90 calendar days of completing the G&G activity. After seafloor sampling is completed, and upon request, BOEM may make pertinent geological data, including core logs, photographs, and related textural data, available to stakeholders and consulting parties in an electronic format. Prior to distribution, BOEM will review this information and determine if any of the data contains sensitive cultural information.

Appendix B

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