

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF OCEAN ENERGY MANAGEMENT, REGULATION, AND  
ENFORCEMENT  
Gulf of Mexico OCS Region  
New Orleans, Louisiana

SITE-SPECIFIC ENVIRONMENTAL ASSESSMENT

OF

REVISED EXPLORATION PLAN NO. R-5055

FOR

BP EXPLORATION & PRODUCTION INC.

July 10, 2010

Related Environmental Documents

Programmatic Environmental Assessment for Geological and Geophysical Exploration  
for Mineral Resources on the Gulf of Mexico Outer Continental Shelf  
(OCS EIS/EA MMS 2004-054)

and

Environmental Impact Statement for Gulf of Mexico OCS Oil and Gas Lease Sales: 2007-2012;  
Western Planning Area Sales 204, 207, 210, 215, and 218; Central Planning Area Sales 205, 206,  
208, 213, 216, and 222 (OCS EIS/EA MMS 2007-018)

## SITE-SPECIFIC ENVIRONMENTAL ASSESSMENT/ FONSI/EIS DETERMINATION

The Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) has reviewed BP Exploration & Production Inc.'s Revised Exploration Plan (EP) (Control No. R-5055) that proposes emergency seismic activities in Mississippi Canyon Area, Block 252, Lease OCS-G32306, to assist with well control operations and remediation of the ongoing pollution event. Based on the conclusions of the SEA, there is no evidence to indicate that the proposed action will significantly (40 CFR 1508.27) affect the quality of the human environment. Preparation of an environmental impact statement is not required. Mitigation is imposed to ensure environmental protection, consistent environmental policy and safety as required by the National Environmental Policy Act (NEPA), or measures needed for compliance with 40 CFR 1500.2(f) regarding the requirement for Federal agencies to avoid or minimize any possible adverse effects of their actions upon the quality of the human environment. This FONSI is valid only insofar as the following conditions are imposed:

### Mitigations

- 1.04 RAMP-UP, PROTECTED SPECIES VISUAL MONITORING, TRAINING, REPORTING, AND EXPERIMENTAL PASSIVE ACOUSTIC MONITORING REQUIREMENTS FOR SEISMIC SURVEY OPERATIONS: You will comply with NTL 2007-G02 Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program. It can be accessed on the web at <http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g02.pdf>.
- 1.05 VESSEL-STRIKE AVOIDANCE/REPORTING: The You will comply with NTL 2007-G04. It can be accessed on the web at <http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g04.pdf>.
- 0.00 ADDITIONAL OBSERVER REPORTING REQUIREMENTS: Protected Species Observers (PSOs) onboard the seismic vessels should report any oiled wildlife to this number (866) 557-1401. PSOs should also collect data as per the National Marine Fisheries Service information sheet at [http://sero.nmfs.noaa.gov/sf/deepwater\\_horizon/Public\\_Flyer\\_Marine\\_Wildlife\\_Response\\_Action\\_Plan.pdf](http://sero.nmfs.noaa.gov/sf/deepwater_horizon/Public_Flyer_Marine_Wildlife_Response_Action_Plan.pdf).



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7/10/2010  
Date

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SITE-SPECIFIC ENVIRONMENTAL ASSESSMENT (SEA) PREPARED FOR  
BP EXPLORATION & PRODUCTION INC.  
GEOLOGICAL AND GEOPHYSICAL APPLICATION No. L10-027

## 1. INTRODUCTION

### 1.1. BACKGROUND

The purpose of this Site-Specific Environmental Assessment (SEA) is to assess the specific impacts associated with BP Exploration & Production Inc.'s proposed geological and geophysical (G&G) activities. The SEA is based on a Programmatic Environmental Assessment (PEA) for G&G Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf (USDOJ, MMS, 2004) which evaluates a broader spectrum of potential impacts resulting from G&G activities across the Eastern, Central, and Western planning areas of the Gulf of Mexico (GOM) Outer Continental Shelf (OCS). The PEA/SEA process is called a "tiering" process and it is detailed in the National Environmental Policy Act's (NEPA's) implementing regulations (40 CFR §1502.20 and §1508.28). The PEA/SEA process is designed to reduce and simplify the size of environmental assessment documents by eliminating repetitive discussions of the same issues. To assist with the new environmental baseline and possible impacts resulting from the Macondo Well blowout and ongoing spill event in Mississippi Canyon Area, Block 252, this SEA also tiers from the Environmental Impact Statement (EIS) for Gulf of Mexico OCS Oil and Gas Lease Sales: 2007-2012; Western Planning Area Sales 204, 207, 210, 215, and 218; Central Planning Area Sales 205, 206, 208, 213, 216, and 222 (USDOJ, MMS, 2007). The subsequent SEAs allow the analyses to focus on specific concerns and effects related to the proposed action.

This SEA conforms to the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) and other appropriate guidelines for preparing environmental assessments by using data presented in the PEA/EIS to complete the assessment. It presents site-specific data regarding the proposed G&G activities and evaluates the potential impacts. This document identifies mitigation measures that should reduce the potential impacts. Preparation of this SEA has allowed the determination of whether a Finding of No Significant Impact (FONSI) is appropriate or whether further assessment of the proposal is necessary under a site-specific EIS.

The G&G surveys provide information used by industry and government to evaluate the potential for offshore oil and gas resources below the surface of the land and seafloor. These operations direct high-intensity, low-frequency sound waves through layers of subsurface rock, which are reflected at boundaries between geological layers with different physical and chemical properties. The reflected sound waves are recorded and processed to provide information about the structure and composition of subsurface geological formations (McCauley, 1994). In an offshore seismic survey, a high-energy sound source is towed at slow speed behind a survey vessel. The sound source typically used is an airgun, a pneumatic device that produces acoustic output through the rapid release of a volume of compressed air.

The description of the air gun is found in Appendix B, Glossary of BOEMRE Terminology. The airgun is designed to direct the high-energy bursts of low-frequency sound (termed a "shot") downward towards the seafloor. Airguns are usually used in sets, or arrays, rather than singly (McCauley, 1994). Reflected sounds from below the seafloor are received by an array of sensitive hydrophones on cables (collectively termed "streamers") that are either towed behind a survey vessel or attached to cables placed on or anchored to the seafloor. A summary of G&G activities being conducted in the Gulf of Mexico is provided in Appendix C of the PEA (USDOJ, MMS, 2004). Table II-2 from the PEA lists the typical G&G activities in the GOM. For this proposal, the operator will conduct a 3-D seismic survey using airgun arrays with streamers.

A detailed description of seismic sources is found in Appendix C of the PEA (USDOJ, MMS, 2004). For the purpose of this analysis, G&G activities include seismic surveys (including high-resolution site surveys and various types of seismic exploration and development surveys), deep tow side-scan sonar

surveys, electromagnetic surveys, and remote sensing. Most G&G activities aimed at OCS mineral exploration are considered a major Federal action under NEPA.

A glossary of BOEMRE terminology relating to this G&G SEA is found in Appendix B. For abbreviations and acronyms, see page xxv of the PEA (USDOJ, MMS, 2004).

## **1.2. PURPOSE, NEED, AND REGULATORY FRAMEWORK, AND DESCRIPTION**

The BOEMRE is mandated to manage the development of OCS oil, gas, and mineral resources, while also ensuring safe operations and protection of the human, marine, and coastal environments. The purpose of the BOEMRE regulatory program is to ensure that the G&G data needed by industry and government are obtained in a technically safe and environmentally sound manner. The BOEMRE performs assessment, leasing, exploration, development, production, and royalty management. The G&G activities aimed at mineral exploration are subject to a complex series of permits and notices. The BOEMRE Resource Evaluation Program oversees G&G data acquisition and permitting activities, pursuant to regulations in 30 CFR (Dellagiarino et al., 1997 and 1998). Specifically, these include (1) Part 251, which regulates prelease G&G exploratory operations for oil, gas, and sulfur resources; and (2) Part 280, which regulates prelease prospecting activities (Fulton, 1998). Other regulations also pertain to one or more of the issues considered in this analysis (e.g., the President's Council on Environmental Quality [CEQ] guidelines for implementation of NEPA and pertinent regulations).

The G&G surveys provide information used by industry and government to evaluate the potential for offshore oil and gas resources and geologic hazards. The oil and gas industry needs accurate data on the location, extent, and properties of hydrocarbon resources, as well as information on shallow geologic hazards and seafloor geotechnical properties, in order to explore, develop, produce, and transport hydrocarbons safely and economically.

The BOEMRE uses high-resolution geophysical data in each of its primary mission areas. The BOEMRE Regulatory staff uses these data to ensure that the proposed site of bottom-founded structures is safe (i.e., via geohazards review) and that the foundations are properly designed (i.e., based on engineering parameters determined from cores), thus ensuring safe operations. The BOEMRE Resource Evaluation staff uses deep seismic data for resources estimation and bid evaluation to ensure that the government receives a fair-market value for tracts offered for lease. The BOEMRE Production and Development staff uses 3D data to map reserves and develop conservation evaluations for conservation of resources.

The BOEMRE Leasing and Environment staff performs analyses to determine whether G&G activity (i.e., seismic survey noise, coastal vessel and aircraft traffic, space-use conflicts with seismic arrays, and seafloor disturbance) have significant impacts on the marine, coastal, or human environments of the GOM (i.e., marine mammals, sea turtles, fishes, commercial and recreational fisheries, coastal and marine birds, benthic communities, and cultural resources). The impacts are determined by an impact analysis that is used (1) to determine whether G&G activities have significant impacts on the marine, coastal, or human environments of the Gulf of Mexico; and (2) to identify significant impacts, if any, for further NEPA analysis. For the impact analysis, resource-specific significance criteria were developed for each category of the affected environment. The criteria reflect consideration of both the context and intensity of impact (40 CFR 1508.27). Criteria for marine mammals and sea turtles reflect the Federal protected status of all species occurring in the Gulf of Mexico. Adverse impacts are classified into one of three levels:

- significant adverse impact (including those that could be mitigated to nonsignificance);
- adverse but not significant impact; or
- negligible impact.

Significance criteria presented in this analysis, reflecting accepted threshold levels for significance (i.e., thresholds are resource-specific), are based on a recent EIS (USDOJ, MMS, 2001b) for proposed floating

production, storage, and offloading (FPSO) systems being considered in the deepwater regions of the Gulf of Mexico. Impacts are also categorized as direct or indirect. No beneficial impacts (either significant or nonsignificant) have been identified.

Preliminary screening is based on a review of relevant literature and previous SEA's and EIS's (e.g., USDOJ, MMS, 1996, 1997, 1998, 1999, 2001a,b) and relevant literature pertinent to historic and projected activities (e.g., Baud et al, 2002).

The following resources were initially considered for impact analysis:

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

A preliminary screening was conducted to focus the impact analysis on those G&G activities and resources with potential for non-negligible impacts. First, a matrix was prepared to identify impact agents associated with each type of G&G activity (Table III-1 of the PEA; USDOJ, MMS, 2004). The impact agents are (1) airgun noise; (2) sonar noise; (3) seafloor disturbance; (4) vessel traffic; (5) towed streamers; and (6) aircraft traffic. A second matrix was prepared to identify resources potentially affected by each type of G&G activity (Table III-2 of the PEA; USDOJ, MMS, 2004). In this preliminary analysis, the level of impact associated with each interaction was categorized as *no impact* (i.e., no measurable impact to a resource evident), *negligible impact* (i.e., measurable but relatively minor impact to a resource predicted), or *potentially adverse impact* (i.e., measurable impact to a resource predicted).

Seismic surveys are the main focus because they have historically covered a large area of the Gulf each year and have the greatest potential for "significant" impacts on the environment. Further, there are increasing concerns in the regulatory and scientific communities regarding acoustic impacts on marine life, including marine mammals, turtles, and fishes. Of particular concern are those species whose hearing capabilities (based on vocalization characteristics) fall within the low frequencies introduced into the marine environment by seismic and geophysical activities. The PEA provides a comprehensive characterization of those biological resources that may be adversely affected by G&G activities. Based on a review of the Gulf's diverse biological resources, several species of marine mammals (sperm, Bryde's, and beaked whales) are deemed to be at greater risk of acoustic impact from seismic surveys. Therefore, seismic surveys are described in the most detail. However, all remaining G&G activities are also described.

In this SEA, BOEMRE evaluates the potential impacts resulting from the operator's proposed ancillary G&G activities, whereas the PEA/EIS provides a comprehensive characterization of those biological

resources that may be adversely affected by G&G activities. Common G&G activities are found on page I-1 of the PEA (USDOJ, MMS, 2004).

This SEA will focus on the affected environment from BP Exploration & Production Inc.'s seismic activities performed in the Central Gulf of Mexico in water depths greater than 200 m.

## 2. PROPOSED ACTION AND ALTERNATIVES

BP Exploration & Production Inc. (BP) proposes to conduct a 2D seismic survey with vessel deployment of the seismic source (airgun array) and towed receivers in Mississippi Canyon Area, Block 252, OCS-G32306. The proposed survey is a requisite emergency action that will assist BP with the current drilling of relief wells on the lease and other efforts to regain control of the Macondo Well and assist in the remediation of the ongoing pollution event/spill. The survey will provide BP with information related to seafloor conditions and the nature/orientation of other geological conditions in the block.

The area of the proposed action is in the Central Planning Area of the Gulf of Mexico, approximately 48 miles offshore, south of Plaquemines Parish, Louisiana. The proposed action is scheduled to begin in July 11, 2010 and last for approximately three- to five-days. The proposed action in R-5055 would normally be categorically-excluded from preparation of a SEA or EIS under Departmental guidelines (516 DM Chapter 6, Appendix 10, C. (13)). However, *extraordinary circumstances* (ECs) could exist because activities proposed under R-5055 may have significant impacts on species listed, or proposed to be listed, on the List of Endangered or Threatened Species (43 CFR §46.215(h)) and may have a direct relationship to other actions with individually insignificant but cumulatively significant environmental effects (43 CFR §46.215(f)). The potential for an EC associated with this proposal requires review under and preparation of this SEA.

### 2.1. RANGE OF ALTERNATIVES

The Coordinator of the SEA evaluated the following range of alternatives:

**Alternative 1** – Proposed Action, or a continuation of the status quo, consisting of the various G&G activities currently occurring and estimated to occur in the foreseeable future (i.e., over the next several decades) in the Western, Central, and Eastern Planning Areas of the GOM, operating under current BOEMRE regulations and requirements (e.g., applicable NTLs). Specifically, G&G operators must adhere to the requirements of NTL No. 2007-G02 when operating in waters >200 m deep in the GOM (and all Federal waters of the Eastern Planning Area) by utilizing ramp-up, employing visual monitoring using trained observers, completing reporting requirements, and having the option of initiating seismic operations during nighttime and periods of limited visibility using passive acoustic monitoring techniques.

**Alternative 2** – Addition of Vessel-based Passive Acoustic Monitoring as a Requirement. Specifically, G&G operators working in water depths >200 m throughout the GOM and all OCS waters of the Eastern Planning Area must adhere to the status quo (i.e., compliance with the requirements of NTL No. 2007-G02: ramp-up, visual monitoring using trained observers, reporting requirements) and must utilize passive acoustic monitoring techniques prior to rampup in conjunction with visual monitoring.

**Alternative 3** – Addition of Both Passive and Active Acoustic Monitoring as a Requirement., specifically, G&G operators working in water depths >200 m throughout the GOM and all OCS waters of the Eastern Planning Area must adhere to the status quo (i.e., compliance with the requirements of NTL No. 2007-G02) and must utilize both passive acoustic monitoring and active acoustic monitoring techniques prior to ramp-up in conjunction with visual monitoring.

**Alternative 4 – Restrict G&G Seismic Surveying Operations.** Under this alternative, the existing suite of G&G activities would continue but with the implementation of additional restrictions on G&G seismic operations. Specifically, G&G operators would be precluded from conducting simultaneous seismic operations (i.e., within 4 km of one another; within an adjacent OCS lease block) in those portions of the GOM most frequented by sperm whales and Bryde’s whales (i.e., water depths >200 m). The purpose of this measure is to remove the potential for simultaneous exposure to seismic noise from concurrent surveys in the same general area.

The preferred alternative for this proposed seismic operation is approval with mitigation measures (modified Alternative 1). Alternative 1 requirements are found on page II-3 (44 of 487) of the PEA. Impacts are found on page III-29 (102 of 487) in the PEA but the modified Alternative 1 mitigations are found on Page II-22 (63 of 487) of the PEA. Modified Alternative 1 was selected because the operator proposes G&G operations in the central or western planning area and needs the additional mitigations to protect the sperm, Bryde’s, Beaked whales and other cetaceans.

### **Selected Alternative Description:**

Modified Alternative 1 meets the underlying need. The current suite of G&G activities provides the oil and gas industry with sufficiently accurate data on the location, extent, and properties of hydrocarbon resources, as well as information on shallow geologic hazards and seafloor geotechnical properties, in order to assist in establishing control of the Macondo Well and assisting with remediation of the spill event.

### **Mitigations**

Approval with Mitigation Measures (Modified Alternative 1)

- 1.04 RAMP-UP, PROTECTED SPECIES VISUAL MONITORING, TRAINING, REPORTING, AND EXPERIMENTAL PASSIVE ACOUSTIC MONITORING REQUIREMENTS FOR SEISMIC SURVEY OPERATIONS: You will comply with NTL 2007-G02 Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program. It can be accessed on the web at <http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g02.pdf>.
- 1.05 VESSEL-STRIKE AVOIDANCE/REPORTING: The You will comply with NTL 2007-G04. It can be accessed on the web at <http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g04.pdf>.
- 0.00 ADDITIONAL OBSERVER REPORTING REQUIREMENTS: Protected Species Observers (PSOs) onboard the seismic vessels should report any oiled wildlife to this number (866) 557-1401. PSOs should also collect data as per the National Marine Fisheries Service information sheet at [http://sero.nmfs.noaa.gov/sf/deepwater\\_horizon/Public\\_Flyer\\_Marine\\_Wildlife\\_Response\\_Action\\_Plan.pdf](http://sero.nmfs.noaa.gov/sf/deepwater_horizon/Public_Flyer_Marine_Wildlife_Response_Action_Plan.pdf).

These mitigations would involve additional costs and delays to operators in obtaining seismic data and would slow OCS exploration and development in a similar fashion to those noted under Alternative 1, but these mitigations will help determine the presence and location of marine mammals and protect them.

## **2.2. SUMMARY AND COMPARISON OF ALTERNATIVES**

A detailed summary and comparison of alternatives is provided in the PEA Section III (Tables III-4 and S-2) and in Appendix C of this SEA as part of a summary evaluation of potential impacts by resource. Alternatives Considered but Not Analyzed, Existing and Proposed Mitigation Measures, and Potential Operational Restrictions are found in Appendix E of the PEA.

Table S-2 compares the environmental consequences of each alternative on a resource by resource basis for seismic operations using air guns. Comparisons of alternatives are based on their perceived

advantages relative to Alternative 1-Proposed Action. Limitations evident in each alternative are also noted in this appendix.

Reduced potential impacts are noted for each of the alternatives (Alternatives 2, 3, and 4). The use of passive acoustic monitoring (Alternative 2) offers to reduce further the potential exposure to seismic survey noise for those whales that vocalize. The combined use of passive and active acoustic monitoring (Alternative 3) also provides potential impact reductions for whales; however, there are notable limitations for employing active acoustic monitoring systems. Under Alternatives 2 and 3, potential impacts to fishes, commercial and recreational fisheries, sea turtles, coastal and marine birds, and benthic resources remain unchanged relative to Alternative 1. Restricting concurrent seismic operations (Alternative 4) is intended to preclude the potential for simultaneous exposure. Industry practice may already effectively implement this restriction. Limitations identified for alternatives, including potential cost ramifications, are also noted.

As evident in Table S-2, Alternatives 2 and 3 do not result in a reduction in impact (due to operational restrictions) to most of the resources listed. Impacts to those resources remain unchanged relative to Alternative 1.

Among sea turtles, visual monitoring (under Alternative 1) offers limited mitigation against vessel strikes under those conditions where individual turtles may be sighted. Alternatives 2, 3, and 4 offer no reduction in impact level relative to Alternative 1.

Among the marine mammals, there are expected decreases in impacts to all vocalizing marine mammals (with the exception of manatees) under Alternative 2 (passive acoustic monitoring) and Alternative 3 (passive and active acoustic monitoring), in spite of the limitations noted for each mitigation measure. Alternative 2 offers the greatest potential for reduced impacts to vocalizing species (e.g., sperm whales); impacts to non-vocalizing marine mammals remain unchanged. A combination of existing NTL requirements and passive acoustic monitoring, while not completely eliminating the limitations inherent in each individual measure, is expected to provide the greatest degree of assurance that no marine mammals (with the exception of manatees) have ventured into the exclusion zone of an operational seismic array. Under Alternative 3, some marine mammals (i.e., those that vocalize) may realize benefit from passive acoustic monitoring, and some species may be detectable using active acoustic monitoring techniques. However, there are limitations and potential impacts associated with active acoustic monitoring that may outweigh its potential benefits (e.g., increased anthropogenic noise in the environment, use of sound sources whose sound pressure levels may exceed acceptable exposure levels, etc.). Alternative 4 offers an indeterminate reduction in the potential for impact to sperm and Bryde's whales; however, current industry practice may already address the need to avoid concurrent seismic survey activity.

In all cases where impacts are expected to decrease, there has been no reduction in impact designation level as initially determined under Alternative 1, due in part to the limitations inherent in each mitigation. Only the potential for impact has been reduced as a result of the mitigation measure. For accidents, all of the Gulf resources evaluated could be affected by a spill caused by an accident involving a G&G vessel. Based on the historical occurrence of vessel accidents (e.g., three incidents reported in the GOM during 1996 and 1997 involving "research vessels," inclusive of G&G vessels), the probability of such incidents occurring is quite low, with the potential for a pollution incident even lower. Records of the volumes of released lubricating oil or diesel fuel in documented G&G vessel accidents has generally been low (i.e., two to five minor releases per year in the GOM). An event involving a survey vessel could result in release of diesel fuel, but such an event has an extremely remote probability of occurring. Thus, incidents

involving survey vessels are not expected to result in significant impacts on any of the Gulf resources considered in this analysis. In all cases, impacts are negligible.

A cumulative activity scenario was developed that identified major activities occurring in the GOM. Similarly, the noise environment of the Gulf also was described. Major impact producing factors (i.e., coincident with other similar activities) under the cumulative activity scenario include vessel traffic (i.e., cargo, tanker, military, commercial fishing, recreational boating) and its associated noise and shipstrike potential. Analysis of the cumulative scenario (exclusive of the Proposed Action) produced predicted impact levels, by resource, which ranged from negligible to potentially adverse but not significant (i.e., no significant impacts were evident). The incremental impact of the Proposed Action was then compared to the cumulative scenario impact determinations to predict incremental impacts. In terms of vessel activity levels, seismic survey vessel activity represents a very small component of total vessel activity in Gulf waters. For example, oil and gas support vessels account for approximately 250,000 transits per year in Gulf waters, with commercial vessels >10,000 dead weight tons (DWT) contributing another 36,000 trips. By comparison, approximately 20 seismic surveys may occur (USDOJ, MMS, 2004).

### **3. DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS**

#### **INTRODUCTION**

The objectives of this impact analysis are (1) to determine whether G&G activities have significant impacts on the marine, coastal, or human environments of the Gulf of Mexico; and (2) to identify significant impacts, if any, for further NEPA analysis.

After a review of previous EAs and EISs (e.g., USDOJ, MMS, 1996, 1997, 1998, 1999, 2001a,b, 2002a,b) and relevant literature pertinent to historic and projected OCS activities (e.g., Baud et al, 2002), the following resources were initially considered for impact analysis:

- marine mammals (including ESA listed species and strategic stocks);
- sea turtles (all are ESA listed species);
- fishes (including listed species and ichthyoplankton);
- commercial and recreational fisheries;
- coastal and marine birds (including ESA listed species);
- benthic communities;
- cultural resources and recreational/commercial diving;
- marine transportation;
- geology/sediments; and
- air and water quality.

A preliminary screening of the PEA indicates that seismic surveys have potentially adverse impacts on marine mammals, sea turtles, fishes, and commercial and recreational fisheries. Negligible impacts are on coastal and marine birds, cultural resources, air quality, and benthic communities (chemosynthetic communities). This analysis will focus on these categories (Page S-6, 30 of 487 of the PEA).

For the impact analysis, resource-specific significance criteria were developed for each category of the affected environment. The criteria reflect consideration of both the context and intensity of impact (40 CFR 1508.27). Criteria for marine mammals and sea turtles reflect the Federal protected status of all species occurring in the Gulf of Mexico. Adverse impacts are classified into one of three levels:

- significant adverse impact (including those that could be mitigated to nonsignificance);
- adverse but not significant impact; or
- negligible impact.

For the purpose of tiering, this section will concentrate on the affected environment and potential impacts on marine mammals, sea turtles, and air quality from the proposed operations in the GOM. Other environmental effects were considered, but the potential impacts that could occur from the proposed activities were fully addressed in the PEA/EIS and deemed insignificant (40 CFR 1508.27) and are not discussed in this SEA. Examples of these include fishes, coastal barrier beaches and associated dunes, wetlands, beach mice, seagrass communities, deepwater benthic communities, and socioeconomic and human resources.

### **3.1. Marine Mammals**

Twenty-nine species of marine mammals occur in the GOM (Davis et al., 2000). The GOM's marine 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 and dugong. Within the GOM, there are 28 species of cetaceans (7 mysticete and 21 odontocete species) and one sirenian species, the manatee (See Appendix D, Table 3.1).

Baleen whale hearing has not been extensively studied. An analysis of marine mammal hearing compiled by Ketten in 1998 showed that mysticetes (baleen whales) exhibited inferred hearing thresholds of 10 to 31,000 Hz, with dominant frequencies of 16 to 25,000 Hz. There are no specific data regarding sensitivity, frequency or intensity discrimination, or localization abilities in baleen whales. Baleen whales apparently are more dependent on low frequency sounds than other marine mammals. The lack of specific data on baleen whale hearing abilities remains a major limitation in evaluating the effects of manmade noise on this group (USDOJ, MMS, 2004).

Toothed whales are most sensitive to high-frequency sounds, e.g., frequencies above approximately 10 kHz. Below that level, sensitivity deteriorates with decreasing frequency; with the possible exception of the sperm whale (Carder and Ridgway, 1990). The sensitivity of many toothed whale species to high frequency sounds is attributed to their use of high frequency sound pulses in echolocation and moderately high frequency calls for communication. Low frequency hearing has not been studied extensively in toothed whales; however some species may be able to detect sound frequencies as low as 60-105 Hz. Below 1 kHz, where most industrial noise energy is concentrated, odontocete hearing sensitivity appears to be relatively poor. Toothed whales possess good intensity and frequency discrimination abilities, as well as good localization capabilities (USDOJ, MMS, 2004).

The hearing sensitivity of the West Indian manatee ranges from 15 Hz to 46 kHz, with best sensitivity between 6 kHz and 20 kHz (Gerstein et al., 1999). The USDOJ, FWS (1996), indicates that the West Indian manatee is sensitive to low frequency noise.

Several environmental factors must be considered when conducting hearing studies or assessing the impacts of manmade noise on free-ranging cetaceans (Dalheim and Ljungblad, 1990), including determinations of 1) ambient noise levels and the potential for masking; 2) sound propagation characteristics of the medium (e.g., water depth, substrate, temperature, salinity, seasonal fluctuation in characteristics such as stratification); 3) absolute sound levels and frequencies reaching the cetacean; and 4) orientation of the cetacean relative to the sound source. Predicting sound propagation has proven to be

a complex issue. For example, hydrophones moored in a remote area of the mid-Atlantic Ocean picked up seismic airgun sounds frequently over a two-year period. Estimates of sound source location indicated that seismic survey vessels were often located 3000 km or more from the hydrophone array (Nieukirk et al., 2004). Tolstoy et al (2004) compared broadband calibration measurements of the seismic sources on the R/V *Ewing* to modeled values and safety radii. They found the modeled values in deep water overestimated the safety radii (measured values for the 160-190 dB radii were not as large as those modeled). However the opposite was true for shallow water. They found that modeled estimates of the 180, 170 and 160 dB radii were underestimates of the actual distances where such levels occur. The results indicated that, in shallow water, reverberations played a significant role and previous modeling had not accounted for bottom reverberations.

Biological factors should also be considered when evaluating the results of hearing studies conducted on marine mammals. Hearing may vary among individuals according to age or sex (Awbrey et al., 1988). Indeed, age related hearing loss has been shown in the structure of cetacean ears, which with a restricted sample size of animals for testing and behavioral observation could be misinterpreted as a hearing injury. The behavioral state of test animals may also influence the responses evoked (Ljungblad et al., 1988). Habituation may also occur under those conditions where a cetacean is repeatedly exposed to a manmade sound (Dalheim and Ljungblad, 1990). However, with regard to habituation, it is difficult to determine if habituation is behavioral (i.e., the animal is voluntarily tolerating a noise level) or whether the animal has become de-sensitized to repeated noise exposure through either temporary or permanent threshold shift (USDOJ, MMS, 2004).

### **3.1.1. Threatened or Endangered Marine Mammal Species**

One toothed whale (the sperm whale), five baleen whales (the northern right, blue, fin, sei, and humpback), and one sirenian (the West Indian manatee) occur in the GOM and are listed as endangered. However, only the sperm whale frequently occurs in oceanic waters of the northern GOM and may be a resident species. All five of the endangered baleen whale species are considered rare or extralimital in the GOM (Würsig et al., 2000, see Appendix D, Table 3.1). None of the five endangered baleen whales known to occur in the GOM are included in the NOAA stock assessments for the Gulf and they will not be further analyzed here. The West Indian manatee (*Trichechus manatus*) inhabits only coastal marine, brackish, and freshwater areas.

#### ***Sperm Whale (Physeter macrocephalus)***

The sperm whale (*Physeter macrocephalus*) is found worldwide in deep waters between approximately 60°N and 60°S latitudes, although generally only large males venture to the extreme northern and southern portions of their range (Jefferson et al., 1993). As deep divers, sperm whales generally inhabit oceanic waters, but they do come close to shore where submarine canyons or other geophysical features bring deep water near the coast (Jefferson et al., 1993). Sperm whales prey on cephalopods, demersal fishes, and benthic invertebrates (Rice, 1989; Jefferson et al., 1993).

The sperm whale is the only great whale that is considered common in the northern GOM (Fritts et al., 1983; Mullin et al., 1994; Davis and Fargion, 1996; Jefferson and Schiro, 1997). Aggregations of sperm whales are commonly found in waters over the shelf edge in the vicinity of the Mississippi River delta in waters that are 500-2,000 m (1,641-6,562 ft) in depth (Mullin et al., 1994; Davis and Fargion, 1996; Davis et al., 2000). They are often concentrated along the continental slope in or near cyclones (Davis et al., 2000). Consistent sightings in the region indicate that sperm whales occupy the northern GOM throughout all seasons (Mullin et al., 1994; Davis and Fargion, 1996; Sparks et al., 1996; Jefferson and Schiro, 1997; Davis et al., 2000). For management purposes, sperm whales in the GOM are provisionally considered a separate stock from those in the Atlantic and Caribbean (Waring et al., 1997). Estimated abundance for the northern GOM is 1,349 individuals (NOAA, 2004).

### ***West Indian Manatee (Trichechus manatus)***

The West Indian manatee (*Trichechus manatus*) is the only sirenian occurring in tropical and subtropical coastal waters of the southeastern U.S., GOM, and Caribbean Sea (Reeves et al., 1992; Jefferson et al., 1993; O’Shea et al., 1995). There are two subspecies of the West Indian manatee: the Florida manatee (*T. m. latirostris*), which ranges from the northern GOM to Virginia; and the Antillean manatee (*T. m. manatus*), which ranges from northern Mexico to eastern Brazil, including the islands of the Caribbean Sea. Manatees primarily use open coastal (shallow nearshore) areas, estuaries, and they are also found far up freshwater tributaries. Manatees often use secluded canals, creeks, embayments, and lagoons, particularly near the mouths of coastal rivers and sloughs, for feeding, resting, mating, and calving (USDOJ, FWS, 2001). During warmer months, manatees are common along the Gulf Coast of Florida from Everglades National Park northward to the Suwannee River in northwestern Florida and less common farther westward. In winter, the GOM subpopulations move southward to warmer waters. The winter range is restricted to waters at the southern tip of Florida and to waters near localized warm-water sources, such as power plant outfalls and natural springs in west-central Florida. Crystal River in Citrus County, is typically the northern limit of the manatee’s winter range on the Gulf Coast. Manatees are uncommon west of the Suwannee River in Florida and are infrequently found as far west as Texas. Manatees are not expected to be impacted by seismic operations due to their coastal and near shore habitat preference.

### **3.1.2. Nonendangered Species**

The remaining 22 marine mammal species that occur in the Gulf of Mexico are nonendangered. However, all marine mammals are protected by the Marine Mammal Protection Act. There are two species of baleen whales that occur in the GOM, the minke whale and the Bryde’s whale. The minke whale is considered rare and is not included in the NOAA Stock Assessment for the Gulf of Mexico. The Bryde’s whale is considered uncommon but is the most frequently sighted baleen whale in the Gulf.

Nonendangered toothed whales include all of the dolphin and small whale/”blackfish” species in the Gulf comprising 20 species. Several of the member species of this group are known to approach and bow ride seismic vessels, even when surveying with active airguns. Two species groups may warrant particular concern regarding seismic activities. The *Kogia* species (pygmy and dwarf sperm whales) are small and cryptic whales that inhabit offshore waters. Very little is known of their life history. The beaked whales have been highly publicized in the last several years due to strandings and deaths attributed to military sonar. Beaked whales are not as small as *Kogia* but they are just as cryptic and difficult to survey. As with *Kogia*, very little is known about beaked whales.

#### ***Bryde’s Whale (Balaenoptera edeni)***

The Bryde’s whale (*Balaenoptera edeni*) is found in tropical and subtropical waters throughout the world. The Bryde’s whale feeds on small pelagic fishes and invertebrates (Leatherwood and Reeves, 1983; Jefferson et al., 1993). Bryde’s whale in the northern GOM, with few exceptions, has been sighted along a narrow corridor near the 100-m (328-ft) isobath (Davis and Fargion, 1996; Davis et al., 2000). Most sightings have been made in the DeSoto Canyon region and off western Florida, though there have been some in the west-central portion of the northeastern GOM. The best estimate of abundance for the northern GOM is 40 individuals (NOAA, 2004).

#### **Pygmy and Dwarf Sperm Whales (Family Kogiidae)**

##### ***Pygmy Sperm Whales (Kogia breviceps)***

The pygmy sperm whale (*Kogia breviceps*) has a worldwide distribution in temperate to tropical waters. They feed mainly on squid, but will also eat crab, shrimp, and smaller fishes (Würsig et al., 2000). In the

GOM, they occur primarily along the continental shelf edge and in deeper waters off the continental shelf (Mullin et al. 1991). At sea, it is difficult to differentiate pygmy from dwarf sperm whales (*Kogia sima*) and sightings are often grouped together as “*Kogia spp.*” The best estimate of abundance for pygmy and dwarf sperm whales combined, in the northern GOM, is 742 individuals (NOAA, 2004).

### ***Dwarf Sperm Whales (Kogia sima)***

The dwarf sperm whale (*Kogia sima*) has a worldwide distribution in temperate to tropical waters (Caldwell and Caldwell 1989). It is believed that they feed on squid, fishes, and crustaceans (Würsig et al., 2000). In the GOM they are found primarily along the continental shelf edge and over deeper waters off the continental shelf (Mullin et al. 1991). At sea, it is difficult to differentiate dwarf from pygmy sperm whales (*Kogia breviceps*) and sightings are often grouped together as “*Kogia spp.*” The best estimate of abundance for dwarf and pygmy sperm whales combined, in the northern GOM, is 742 individuals (NOAA, 2004).

### **Beaked Whales (Family Ziphiidae)**

#### ***Cuvier’s Beaked Whale (Ziphius cavirostris)***

Cuvier’s beaked whale (*Ziphius cavirostris*) is widely (but sparsely) distributed throughout temperate and tropical waters worldwide (Würsig et al. 2000). Their diet consists of squid, fishes, crabs, and starfish. In the northern GOM, they are broadly distributed in waters greater than 1,000 m over lower slope and abyssal landscapes (Davis et al., 1998 and 2000). Sightings data indicate that Cuvier’s beaked whale is probably the most common beaked whale in the GOM (Jefferson and Schiro, 1997; Davis et al., 1998 and 2000). Abundance estimates for Cuvier’s beaked whale in the northern GOM is 95 individuals (NOAA, 2004).

#### ***Gervais’ Beaked Whale (Mesoplodon europaeus)***

Gervais’ beaked whale (*Mesoplodon europaeus*) appears to be widely but sparsely distributed worldwide in temperate to tropical waters (Leatherwood and Reeves, 1983). Little is known about their life history, but it is believed that they feed on squid (Würsig et al., 2000). Beaked whales in the GOM are grouped into an undifferentiated complex (*Mesoplodon spp.* and *Ziphius sp.*) due to the difficulty of at sea identification. In the northern GOM, they are broadly distributed in waters greater than 1,000 m over lower slope and abyssal landscapes (Davis et al., 1998 and 2000). Stranding records suggest that this is probably the most common mesoplodon in the northern GOM (Jefferson and Schiro, 1997). Abundance estimates for the undifferentiated beaked whale complex in the northern GOM is 106 individuals (NOAA, 2004).

#### ***Blainville’s Beaked Whale (Mesoplodon densirostris)***

Blainville’s beaked whale (*Mesoplodon densirostris*) is distributed throughout temperate and tropical waters worldwide, but is not considered common (Würsig et al., 2000). Little life history is known about this secretive whale, but it is known to feed on squid and fish. Beaked whales in the GOM are grouped into an undifferentiated complex (*Mesoplodon spp.* and *Ziphius sp.*) due to the difficulty of at sea identification. In the northern GOM, they are broadly distributed in waters greater than 1,000 m over lower slope and abyssal landscapes (Davis et al., 1998 and 2000). Abundance estimates for the undifferentiated beaked whale complex in the northern GOM is 106 individuals (NOAA, 2004).

#### ***Sowerby’s Beaked Whale (Mesoplodon bidens)***

Sowerby’s beaked whale (*Mesoplodon bidens*) occurs in cold temperate to subarctic waters of the North Atlantic and feeds on squid and small fishes (Würsig et al., 2000). It is represented in the GOM by only a single record, a stranding in Florida; this record is considered extralimital since this species normally

occurs much farther north in the North Atlantic (Jefferson and Schiro, 1997). There are no abundance estimates for the GOM.

## **Impact Analysis**

The impact-producing factors associated with the proposed action that could affect both threatened/endangered and nonendangered marine mammals include (1) noise from survey activities and (2) collision with survey vessels. Section III.B.2 of the PEA contains a discussion of the potential impacts from survey operations on marine mammals (USDOI, MMS, 2004). Chapters 4.2.1.1.5 and 4.2.2.1.5 of the EIS (USDOI, MMS, 2007) contain a discussion of additional impacts related to the ongoing pollution event caused by the blow-out/spill in Mississippi Canyon Area, Block 252. Both discussions are summarized below and are hereby incorporated by reference into this SEA.

### ***Standard Operations***

Richardson et al. (1995) defined four zones of potential noise effects on marine mammals. In order of increasing severity, the zones are:

- audibility;
- responsiveness;
- masking; and
- hearing loss, discomfort, or injury (physical effects).

Potential impacts in the Gulf of Mexico are likely to include behavioral effects, which could have extensive radii (kilometers) from airgun sources, and possibly physical effects extending from behavioral modification and acoustically induced decompression sickness (DCS). Perceived wisdom from other studies suggests that audibility in itself is not likely to cause adverse impacts and that masking is not likely to pose a major problem due to the low duty cycle of seismic pulses. Temporary Threshold Shift (TTS) and Permanent Threshold Shift (PTS) are only likely to occur at close ranges (tens or perhaps hundred of meters from an airgun source). Therefore, physical damage to auditory structures is only likely in extreme proximity to airgun sources. Recent debate has introduced the possibility of DCS as a physical effect that could be acoustically induced to some deep diving marine mammals. Those effects might occur in response to sound levels considerably lower than those required to produce TTS and PTS in auditory structures.

### **Endangered/Threatened Marine Mammals**

Sperm whales are the only endangered species in the Gulf of Mexico potentially impacted by industry seismic operations. Behavioral disturbance, such as cessation of vocalizations and startle reactions, have been reported for sperm whales. However, research in the Gulf reported no alteration in vocalizations or observed behavior modification. Also in the Gulf, areas such as the Mississippi Delta that were historically populated with sperm whales are still areas of sperm concentration in spite of oil and gas industry development and seismic activity. There are, as yet, insufficient data to assign thresholds for acoustic disturbance to sperm whales.

There are few documented data on physical effects of high levels of sound on sperm whales. The deep diving habit of sperm whales may create a greater vulnerability to being in regions of increased ensonification, relative to more near-surface species. Seismic airgun arrays are generally configured to produce a maximum, low frequency energy lobe directly downwards towards the seabed and a deep dive could take a whale down to a depth where they could be passed over directly by an operating seismic vessel without their being visually detected. However, studies in the Gulf of Mexico showed that the marine mammal sighting rate did not change significantly due to seismic exploration signals and the analysis of the results was unable to detect small-scale (<100 km) changes in marine mammal distribution.

Mitigations currently in effect for seismic operations include ramp up of the airgun array and visual monitoring during all daylight hours, as well as observer training, reporting, and vessel strike avoidance.

Seismic airguns cease firing when any whale comes within 500m of the sound source and visual observers monitor the movements of surfaced marine mammals. Ramping up the airguns is a mitigation to “warn” animals in the area of the increasing sound source and give animals the opportunity to move away or avoid ensonified regions. This may be effective for both surfaced and submerged marine mammals. The transitory nature of seismic surveys results in only the temporary acoustic disturbance of any given region.

### **Nonendangered Marine Mammals**

As toothed whales, *Kogia sp.* and beaked whales share similarities with the sperm whale, including deep diving and the almost certain use of echolocation clicks for navigation and prey location. Little, if anything, is known of detailed behavior responses of these animals to anthropogenic sound. However, their behavior may be linked to observed physical effects, and can only be extrapolated at this time.

There are now several examples of possible acoustically induced stranding events by beaked whales, including those that are strongly correlated to the use of military sonar. It must be emphasized that sonar and seismic acoustic events are vastly different both in frequency range and pulse duration. However, it is now generally accepted that at least in some instances, beaked whale stranding events were acoustically induced, and that they occurred in response to received sound levels much lower than would be expected to give rise to “normal” physical trauma in marine mammals. The deep diving habit of beaked whales, and *Kogia* may, like sperm whales, increase their risk of being exposed to higher energy levels from downward-directed seismic pulses. There is evidence that beaked whales may be vulnerable to acoustically and/or behaviorally induced decompression sickness from rapid surfacing or inability to repeat a deep dive.

Baleen whales have probably been the most studied group of marine mammals in the open ocean in terms of observations of behavioral changes in response to seismic operations and other high level sound sources. The Bryde’s whale is the only baleen whale regularly occurring in the Gulf of Mexico. Although there have been no studies of Bryde’s whale reactions to seismic surveys, it is generally considered on the basis of vocalization frequencies and ear anatomy (Ketten, 1998) that the auditory abilities of all baleen whale species are broadly similar. In terms of overall sensitivity to seismic activities, baleen whales are probably a relatively “high risk” category amongst the marine mammals. There is clearly a possible overlap between the expected frequencies of good hearing sensitivity in baleen whales and maximal airgun output at source. Avoidance reactions by baleen whales to seismic and seismic-type sounds have been reported. Pressure pulses from airguns have the potential for damaging the hearing of all marine mammals, including baleen whales. However, there are no data for TTS, PTS, or even hearing thresholds in baleen whales. Since baleen whales are not typically deep divers, it is less likely they would suffer from acoustically and/or behaviorally induced decompression sickness than might be the case for some of the toothed whales.

In the eastern Gulf, where Bryde’s whales are almost exclusively found, the observer mitigations are for all federal waters, not just those greater than 200m as in the central and western Gulf. With an estimated abundance of 40 individuals in the Gulf of Mexico (NOAA, 2004), the probability of a Bryde’s whale being in the proximity of a Central Gulf of Mexico seismic operation is extremely low. The cryptic behavior and the apparent avoidance of ships in general by *Kogia* and beaked whales, as well as ramp-up requirements for seismic operations to warn animals out of the ensonified area, should reduce the probability of exposure to high levels of sound by those species groups.

### ***Macondo Well Blowout/Spill***

The ongoing oil spill resulting from the Macondo Well blowout and spill in Mississippi Canyon Area, Block 252 and related spill-response activities are likely impacting marine mammals in the area of the proposed action. The animals’ exposure to hydrocarbons persisting in the sea is possibly resulting in sub-lethal impacts (e.g., decreased health, reproductive fitness, and longevity; and increased vulnerability to disease) and some soft tissue irritation, respiratory stress from inhalation of toxic fumes, food reduction or contamination, direct ingestion of oil and/or tar, and temporary displacement from preferred habitats or migration routes. Though there is currently limited evidence that many marine mammals are among the

affected population, these impacts could leave exposed animals under greater stress and unresponsive to approaching vessels.

Even though a complete understanding of the effects of the active response/cleanup activities on marine mammals is lacking, it is expected that the large amount of chemical dispersants being used on the slicks are acting as an irritant on the animals' tissues and sensitive membranes. The increased human presence (e.g., vessels) are likely adding to changes in behavior and/or distribution, thereby stressing animals further and perhaps making them more vulnerable to various physiologic and toxic effects.

### ***Conclusion***

The noise related to the proposed survey is expected to have little impact on the vitality of any marine mammals or productivity of any population endemic to the northern Gulf of Mexico. The proposed seismic activities are not expected to cause long-term or permanent displacement of the animals from critical or other preferred habitat, nor will they result in the destruction or adverse modification of critical habitat. Survey activities will involve vessel traffic, which carries some risk of collisions; however, since the animals are submerged most of the time and may avoid seismic arrays, the risk of death or life-threatening injury is low. Even for animals that may be undergoing additional stress/sublethal impacts from the ongoing pollution event, the slow vessel speed coupled with adherence to the Vessel Strike Avoidance NTL (No. 2007-G04) should reduce or eliminate potential impacts. Therefore, considering the full suite of mitigation (i.e., for ramp-up, visual monitoring, reporting, protective species identification training, vessel strike avoidance, and injured/dead protected species reporting) the incremental impacts of the proposed action on marine mammals will be negligible most of the time, with occasional impacts being adverse but not significant (e.g., when an animal cannot avoid and is subsequently exposed to seismic survey noise).

## **3.2. TURTLES**

### **Description**

Five species of sea turtle are found in the waters of the Gulf of Mexico: green, leatherback, hawksbill, Kemp's ridley, and loggerhead (Pritchard, 1997). All are protected under the ESA, and all except the loggerhead turtle (threatened) are listed as endangered. Sea turtles are long-lived, slow-reproducing animals that spend nearly all of their lives in the water. Females must emerge periodically from the ocean to nest on beaches. It is generally believed that all sea turtle species spend their first few years in pelagic waters, occurring in driftlines and convergence zones (in Sargassum rafts) where they find refuge and food in items that accumulate in surface circulation features (Carr and Caldwell, 1956; Carr, 1987). Genetic analysis of sea turtles has revealed in recent years that discrete, non-interbreeding stocks of sea turtles make up "worldwide extensive ranges" of the various species.

Adult turtles are apparently less abundant in the deeper waters of the Gulf than they are in waters less than 27-50 m (80-160 ft) deep and more abundant in the northeastern Gulf than in the northwestern Gulf (NRC, 1990). Sea turtle abundance appears to increase dramatically east of Mobile Bay (Davis et al., 2000). Factors such as water depth and turbidity, bottom sediment type, salinity, and prey availability may account for this. In the offshore Gulf, sea turtle distribution has been linked to zones of convergence.

There are no designated critical habitats for sea turtles in the northern Gulf of Mexico. The NMFS recognizes many coastal areas of the Gulf as preferred habitat (important, sensitive habitats that are essential for the species within a specific geographic area); e.g., seagrass beds in Texas lagoons and other nearshore or inshore areas (including jetties) for green turtles; and bays and lakes, especially in Louisiana and Texas for Kemp's ridley turtles. Sargassum mats also are recognized as preferred habitat for hatchlings. There are no designated migratory routes for turtles in the Gulf.

Additional information on sea turtle species of the Gulf of Mexico is provided in Appendix E of the PEA (USDOJ, MMS, 2004) and in Chapter 3.2.4 of the EIS (USDOJ, MMS, 2007) and is hereby incorporated by reference into this SEA.

## **Impact Analysis**

The impact-producing factors associated with the proposed action that could affect sea turtles include (1) noise from survey activities and (2) collision with survey vessels. Section III.C.2 of the PEA contains a discussion of the potential impacts from survey operations on marine mammals (USDOJ, MMS, 2004). Chapters 4.2.1.1.6 and 4.2.2.1.6 of the EIS (USDOJ, MMS, 2007) contain a discussion of additional impacts related to the ongoing pollution event caused by the blow-out/spill in Mississippi Canyon Area, Block 252. Both discussions are summarized below and are hereby incorporated by reference into this SEA.

### ***Standard Operations***

The main concern from an impact perspective is noise from seismic surveys. Impacts of seismic surveys on sea turtles may include auditory trauma (impact) and/or behavioral disturbance. Acoustic impacts to sea turtle hearing capabilities and the summary serving as the basis for assessing the environmental impact of G&G activities upon sea turtles are reviewed in Appendix G of the PEA (USDOJ, MMS, 2004). Seismic survey noise may disturb sea turtles and may produce temporary or permanent hearing impairment in some individuals, but it is unlikely to cause death or life-threatening injury. Seismic surveys are not expected to cause long-term or permanent displacement of sea turtles from critical or other preferred habitat, nor will they result in the destruction or adverse modification of critical habitat. The proposed seismic survey activities will also involve vessel traffic, which carries some risk of collisions with turtles. Because sea turtles are submerged most of the time and may avoid seismic arrays, the risk of death or life-threatening injury is low.

### ***Macondo Well Blowout/Spill***

The ongoing oil spill resulting from the Macondo Well blowout and spill in Mississippi Canyon Area, Block 252 and related spill-response activities are likely impacting sea turtles in the area of the proposed action. It is currently impossible to estimate precisely the magnitude or in what numbers each species is being impacted. It is expected that as the spill residues disperse into the physical environment (i.e., water, sediments, and particulates), sea turtles are being exposed via the waters that they drink and swim, as well as via the prey they consume. Contact with petroleum and consumption of oil and oil-contaminated prey has the potential to cause chronic (longer-term lethal or sub-lethal oil-related injuries) and acute (spill-related deaths occurring during a spill) effects on turtles. The ongoing spill response and cleanup efforts is also likely harming the animals as they come in contact with booms, skimming vessels, and other remediation efforts. As a result, sea turtles in the area of the proposed action are likely under a great deal of stress and unresponsive to approaching vessels.

### ***Conclusion***

The noise related to the proposed survey is expected to have little impact on the vitality of any sea turtles or productivity of any population endemic to the northern Gulf of Mexico. The proposed seismic activities are not expected to cause long-term or permanent displacement of the animals from critical or other preferred habitat, nor will they result in the destruction or adverse modification of critical habitat. Survey activities will involve vessel traffic, which carries some risk of collisions; however, since the animals are submerged most of the time and may avoid seismic arrays, the risk of death or life-threatening injury is low. Even for animals that may be undergoing additional stress/sublethal impacts from the ongoing pollution event, the slow vessel speed coupled with adherence to the Vessel Strike Avoidance NTL (No. 2007-G04) should reduce or eliminate potential impacts. Therefore, considering the full suite of mitigation (i.e., for ramp-up, visual monitoring, reporting, protective species identification training, vessel strike avoidance, and injured/dead protected species reporting) the incremental impacts of the proposed action on sea turtles will be negligible most of the time, with occasional impacts being adverse

but not significant (e.g., when an animal cannot avoid vessel strike or is subsequently exposed to seismic survey noise).

### **3.3. AIR QUALITY**

#### **Description**

The description of the air quality in the Gulf of Mexico region can be found in Chapter 3.1.1 of the EIS (USDOJ, MMS, 2007). The following information is a summary of the description and is hereby incorporated by reference into this SEA.

Air quality of the coastal areas bordering the Gulf of Mexico is measured against the National Ambient Air Quality Standards (NAAQS) resulting from the Clean Air Act, as amended, or restrictive standards adopted by a state. The NAAQS have been adopted by all of the five Gulf of Mexico states coastal to the Gulf of Mexico (USDOJ, MMS, 2002a,b). The air over the OCS water is not classified, but it is presumed to be better than the NAAQS for all criteria pollutants.

The influence to onshore air quality is dependent upon meteorological conditions and air pollution emitted from operational activities. The pertinent meteorological conditions regarding air quality are the wind speed and direction, the atmospheric stability, and the mixing height (which govern the dispersion and transport of emissions). In addition, there are other synoptic scale patterns that occur periodically, namely tropical cyclones, and mid-latitude frontal systems.

#### **Impact Analysis**

The impact-producing factor associated with the proposed action that could affect air quality is pollutants emitted from survey vessels. Chapters 4.2.1.1.1, 4.2.2.1.1, 4.4.1, and 4.5.1 of the EIS (USDOJ, MMS, 2007) contain a discussion of standard impacts and additional concerns related to the ongoing pollution event caused by the blow-out/spill in Mississippi Canyon Area, Block 252. The discussion is summarized below and hereby incorporated by reference into this SEA.

#### ***Standard Operations***

The Air quality could be affected in the immediate vicinity of the proposed action by vessel emissions; however, these activities are not expected to significantly affect onshore air quality.

#### ***Macondo Well Blowout/Spill***

The ongoing oil spill resulting from the Macondo Well blowout and spill in Mississippi Canyon Area, Block 252 and related spill-response activities are impacting air quality in the area of the proposed action. The surface hydrocarbons themselves are leading to the emission of multiple air pollutants. In addition, flaring, direct burning (from the production equipment on the *Enterprise/Q4000*), and daily in-situ burning of portions of the spill are leading to the release of NO<sub>2</sub>, CO<sub>2</sub>, SO<sub>x</sub>, VOC's, PM<sub>10</sub>, and PM<sub>2.5</sub>.

#### ***Conclusion***

Due to the limited nature of the proposed seismic survey operations, these potential impacts to air quality are temporary and localized. Even though the pollutant concentration levels could be high dependent upon the proximity to the spill site/in-situ burning and certain atmospheric conditions, the additional air emissions from the proposed activities are not expected to significantly affect the air quality of any onshore area.

### **3.4. OTHER CONSIDERATIONS**

A discussion of the other resources considered but not analyzed under this SEA can be found in Section III. of the PEA (USDOJ, MMS, 2004) and Chapter 3 of the EIS (USDOJ, MMS, 2007).

## 4. PUBLIC OPINION

A discussion of public concerns regarding general G&G activities In the Gulf of Mexico Region can be found in appendix IV of the PEA. The PEA addresses public comments and outreach conducted for the programmatic document; however, no public commenting/reviews will be conducted at the site-specific level.

## 5. CONSULTATION AND COORDINATION

The information in this SEA was obtained from BOEMRE personnel listed on pages VI-1 and VI-2 and from other Federal agencies, private sector, and academia personnel found on pages IV-1 and IV-2 of the PEA (USDOJ, MMS, 2004).

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## **8. APPENDICES**

- Appendix A Proposed Mitigation Measures
- Appendix B Glossary of BOEMRE Terminology
- Appendix C Summary and Comparison of Environmental Impacts from Each Alternative on a Resource by Resource Basis
- Appendix D Marine Mammals of the Gulf of Mexico

**Appendix A**  
**Proposed Mitigation Measures**

## **Mitigations**

- 1.04 RAMP-UP, PROTECTED SPECIES VISUAL MONITORING, TRAINING, REPORTING, AND EXPERIMENTAL PASSIVE ACOUSTIC MONITORING REQUIREMENTS FOR SEISMIC SURVEY OPERATIONS: You will comply with NTL 2007-G02 Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program. It can be accessed on the web at <http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g02.pdf>.
- 1.05 VESSEL-STRIKE AVOIDANCE/REPORTING: The You will comply with NTL 2007-G04. It can be accessed on the web at <http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g04.pdf>.
- 0.00 ADDITIONAL OBSERVER REPORTING REQUIREMENTS: Protected Species Observers (PSOs) onboard the seismic vessels should report any oiled wildlife to this number (866) 557-1401. PSOs should also collect data as per the National Marine Fisheries Service information sheet at [http://sero.nmfs.noaa.gov/sf/deepwater\\_horizon/Public\\_Flyer\\_Marine\\_Wildlife\\_Response\\_Action\\_Plan.pdf](http://sero.nmfs.noaa.gov/sf/deepwater_horizon/Public_Flyer_Marine_Wildlife_Response_Action_Plan.pdf).

**Appendix B**  
**Glossary of BOEMRE Terminology**

- Airgun — A device that releases compressed air into the water column, creating an acoustical energy pulse with the purpose of penetrating the seafloor.
- Dolphins — means all marine mammal species in the Family *Delphinidae*. In the Gulf of Mexico, this includes, among others, killer whales, pilot whales, and all of the “dolphin” species.
- Exclusion zone — The area at and below the sea surface within a radius of 500 m surrounding the center of an airgun array and the area within the immediate vicinity of the survey vessel.
- OBS — An Ocean Bottom Sensor is a device that is deployed on the seabed and used to receive seismic signals during surveys.
- Passive Acoustic Monitoring — Acoustic monitoring is passive (i.e., no acoustic sources are used, only listening devices) and can occur either from a vessel-based system or from a hydrophone or sonobuoy array placed on the seafloor, or both.
- PTS — Permanent threshold shift is a raising of the hearing threshold from overexposure to high-level sound; but, in this case, permanent damage occurs to the inner ear sensory mechanisms and hence the shift is nonreversible.
- Ramp-up — Ramp-up is also known as “soft start”, “slow start”, or “slow build up”. The gradual increase in emitted sound levels from an airgun array by systematically turning on the full complement of an array’s airguns over a defined period of time (i.e., at a rate of 6 dB re 1  $\mu$ Pa per 5 minute interval).
- TTS — Temporary threshold shift is the temporary raising of hearing threshold resulting from exposure to high-level sounds. This is the lowest end of the physical effects scale which is a temporary, reversible form of hearing impairment. In TTS, the lower threshold of hearing in the relevant frequency band is increased (i.e., hearing becomes less sensitive) when exposed to a critical combination of sound intensity and duration.
- Visual monitoring — Means the use of trained observers to scan the ocean surface visually for the presence of marine mammals and sea turtles. These observers must have successfully completed a visual observer training program as described in NTL 2004-G01. The area to be scanned visually includes, but is not limited to, the exclusion zone. Visual monitoring of an exclusion zone and adjacent waters is intended to establish and, when visual conditions allow, maintain a zone around the sound source and seismic vessel that is clear of marine mammals and sea turtles, thereby reducing or eliminating the potential for injury.
- Whales — Means all marine mammals in the Gulf of Mexico except dolphins (see definition) and manatees. This includes all species of baleen whales (Suborder Mysticeti), all species of beaked whales (*Ziphius cavirostris* and *Mesoplodon* sp.), sperm whales (*Physeter macrocephalus*), and pygmy and dwarf sperm whales (*Kogia* sp.). Of the baleen whales, only the Bryde’s whale (*Balaenoptera edeni*) is expected to be present in the northern Gulf of Mexico and is considered common. This species has primarily been sighted in water depths less than 200 m in the eastern Gulf of Mexico. Sightings of other baleen species are highly unlikely.

## **Appendix C**

### **Summary and Comparison of Environmental Impacts from Each Alternative on a Resource-by-Resource Basis**

Table S-2

## Summary and Comparison of Environmental Impacts from Each Alternative on a Resource by Resource Basis

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Resource	Alternative 1 – Proposed Action <sup>1</sup>	Alternative 2 – Addition of Vessel-based Passive Acoustic Monitoring as a Requirement	Alternative 3 – Addition of Both Passive and Active Acoustic Monitoring as Requirements	Alternative 4 – Restrict G&G Seismic Survey Operations
Marine Mammals				
<i>Sperm whales</i>	<p>Potentially <i>adverse but not significant</i> impact from potential exposure to elevated, repetitive, intermittent, and localized noise levels, resulting in possible hearing impairment. No mortality or serious injury (i.e., no exceedance of the Potential Biological Removal [PBR] level); no displacement from key habitat; no long-term or permanent displacement from preferred feeding, breeding, or nursery habitats; no substantial or chronic disruption of behavioral patterns that may adversely affect sperm whales through effects on annual rates of recruitment or survival. In water depths <math>\geq 200</math> m throughout the GOM and Federal waters <math>&lt; 200</math> m in the Eastern Planning Area, under requirements of Notice to Lessees (NLT) No. 2004-G01, visual monitoring of the 500-m exclusion zone reduces the likelihood that whales will be present in close proximity to an array. When coupled with ramp-up, these measures may reduce the potential for hearing impairment or other injury to sperm whales from instantaneous start-up of an airgun array. Potential for acoustic impact to sperm whales remains, as undetected individuals may enter the zone of maximum ensonification below an array during a dive.</p> <p>Limitations: 1) visual monitoring effective during daylight, good visibility/sightability conditions; 2) ramp-up remains unproven as a mitigation measure, although recognized as a common sense measure; 3) species/group specific limitations (detectability); and 4) minor cost ramifications.</p>	<p>Potentially <i>adverse but not significant</i>. Passive acoustic monitoring relies on passive sensing and location of whale vocalizations. Potential for impact may be reduced if whales vocalize and are detected. Assumed to be effective for sperm whales, as they frequently vocalize. Potential for impact to sperm whales is not completely eliminated, impact level remains potentially <i>adverse but not significant</i>.</p> <p>Limitations: Passive acoustic monitoring 1) only works for vocalizing whales; many animals are quiet much of the time, especially when disturbed; 2) difficult to determine the range to the vocalizing animals when using a towed array; 3) cannot readily determine depth to vocalizing animals; 4) for fixed hydrophones (ship or bottom mounted recorders, sonobuoys, ocean bottom cables), area of coverage/detection range may be limited by noise, requiring more sensors to cover a seismic survey area; 5) requires hydrophone arrays be towed behind the survey vessel (or from an additional chase boat); 6) hydrophone performance may be affected by tow speed and the ship's acoustic characteristics, limiting detection range; and 7) cost ramifications.</p>	<p>Potentially <i>adverse but not significant</i>. Passive acoustic monitoring relies on passive sensing and location of whale vocalizations. Active acoustic monitoring relies on an active (e.g., sonar) search for whales. Potential for impact may be reduced. Passive acoustic monitoring may be effective for sperm whales, as they frequently vocalize. Potential for impact to sperm whales may be reduced if whales vocalize and are detected.</p> <p>Advantages of passive acoustic monitoring relative to active acoustic monitoring include: 1) longer ranges can be achieved; 2) omnidirectional; 3) species can be potentially identified by their vocalization signature; 4) no acoustic footprint that could affect the target animals; and 5) more mature and affordable technology. Advantages of active acoustic monitoring compared with passive acoustic are as follows: 1) works with non-vocalizing or cryptic whales and those species that exhibit only limited vocalization; 2) can in some cases determine 3D range and bearing, including depth of vocalizing animals; 3) avoids having to stream behind survey vessel if sound source and hydrophone/receiver are hull-mounted; and 4) may involve less bulky equipment, minimizing personnel required for handling and operation.</p> <p>Limitations: Active acoustic monitoring has the following disadvantages: 1) active source may be more harmful than the sound source it is being used to mitigate; 2) limited detection ranges depending on power and frequency; 3) inability to identify species based purely on size; 4) limited beam width and associated problems seeing deep-diving whales at close range; 5) active systems could potentially affect the behavior of the animals themselves; 6) towfish would be required, possibly larger than passive acoustic monitoring array; and 7) current costs for development and deployment are higher.</p>	<p>Potentially <i>adverse but not significant</i>. Restrictions on concurrent seismic operations will prevent the potential for simultaneous exposure. Acoustic impacts to sperm whales would be slightly reduced; however, the potential for acoustic impacts to sperm whales remains. Industry practice may already effectively implement this restriction. Limitations: None.</p>

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Table S-2  
Summary and Comparison of Environmental Impacts from Each Alternative on a Resource by Resource Basis  
(Continued)

Resource	Alternative 1 – Proposed Action <sup>1</sup>	Alternative 2 – Addition of Vessel-based Passive Acoustic Monitoring as a Requirement	Alternative 3 – Addition of Both Passive and Active Acoustic Monitoring as Requirements	Alternative 4 – Restrict G&G Seismic Survey Operations
<i>Bryde's whales</i>	Potentially <i>adverse but not significant</i> impact from potential exposure to injurious noise levels (repetitive, intermittent, and localized); same effects as sperm whales, above (e.g., no PBR exceedances, etc.). Effective visual monitoring when coupled with ramp-up may reduce the potential for hearing impairment or other injury to Bryde's whales from instantaneous start-up of an airgun array. Visual monitoring of a pre-determined impact zone reduces the potential for hearing impairment. The potential for acoustic impact is reduced. Potential for acoustic impacts to Bryde's whales remains. Limitations: Ramp-up unproven as a mitigation measure. Visual monitoring effective only during daylight, during periods of good visibility, cost ramifications.	Potentially <i>adverse but not significant</i> . Same as sperm whales above – potential for impact remains. Bryde's whales are known to vocalize, but the frequency of their vocalizations may be problematic; passive acoustic effective only when whales vocalize; geographic and depth limits of this species may further limit mitigation effectiveness. Limitations: Same as above.	Potentially <i>adverse but not significant</i> . Bryde's whales are known to vocalize; frequency of vocalization may be problematic; passive acoustic effective only when whales vocalize; geographic and depth limits of this species may further limit mitigation effectiveness. Active acoustic may be problematic. Potential for impact remains. Limitations: Same as above.	Potentially <i>adverse but not significant</i> . Same as sperm whales above – potential for impact remains the same. Limitations: Same as above.
<i>Beaked whales</i>	Potentially <i>adverse but not significant</i> impact from potential exposure to injurious noise levels (repetitive, intermittent, and localized); same effects as sperm whales, above (e.g., no PBR exceedances, etc.).	Potentially <i>adverse but not significant</i> . Beaked whales same as Bryde's whales above – potential for impact remains. Limitations: Same as above.	Potentially <i>adverse but not significant</i> . Beaked whales same as Bryde's whales above – potential for impact remains. Limitations: Same as above.	Potentially <i>adverse but not significant</i> . Same as sperm whales above – potential for impact remains. Limitations: Same as above.
<i>Other cetaceans</i>	Potentially <i>adverse but not significant</i> impact from potential exposure to injurious noise levels (repetitive, intermittent, and localized).	Potentially <i>adverse but not significant</i> . Same as sperm whales above – potential for impact remains. Limitations: Same as above.	Potentially <i>adverse but not significant</i> . Same as sperm whales above – potential for impact remains. Limitations: Same as above.	Potentially <i>adverse but not significant</i> . Same as sperm whales above – potential for impact remains. Limitations: Same as above.
<i>Manatees</i>	<b>Negligible</b> impact due to unlikely exposure.	<b>Negligible</b> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	<b>Negligible</b> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	<b>Negligible</b> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.
Sea Turtles	Impacts primarily <i>negligible</i> , but may elevate to potentially <i>adverse but not significant</i> from potential exposure to injurious noise levels (repetitive, intermittent, and localized) and vessel traffic; seismic noise may disturb sea turtles and may produce temporary or permanent hearing impairment in some individuals, but is unlikely to cause death or life-threatening injury. Seismic surveys and other G&G activities are not expected to cause long-term or permanent displacement from critical habitat/preferred habitat, nor result in destruction or adverse modification of critical	<b>Negligible</b> to potentially <i>adverse but not significant</i> . No effect of mitigation due to lack of vocalization; potential for impact remains the same. Limitations: Same as above. No effect of mitigation due to lack of vocalization	<b>Negligible</b> to potentially <i>adverse but not significant</i> . Potential for impact remains the same. Limitations: Same as above.	<b>Negligible</b> to potentially <i>adverse but not significant</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.

Table S-2  
Summary and Comparison of Environmental Impacts from Each Alternative on a Resource by Resource Basis  
(Continued)

Resource	Alternative 1 – Proposed Action <sup>1</sup>	Alternative 2 – Addition of Vessel-based Passive Acoustic Monitoring as a Requirement	Alternative 3 – Addition of Both Passive and Active Acoustic Monitoring as Requirements	Alternative 4 – Restrict G&G Seismic Survey Operations
Fishes	<i>Negligible</i> to potentially <i>adverse but not significant</i> impact from seismic survey noise (repetitive, intermittent, and localized); noise may disturb fish and may produce temporary or permanent hearing impairment in some individuals, but is unlikely to cause death or life-threatening injury. Seismic surveys are not expected to cause long-term or permanent displacement of any listed species from critical habitat/preferred habitat, nor to result in destruction or adverse modification of critical habitat or essential fish habitat.	<i>Negligible</i> to potentially <i>adverse but not significant</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	<i>Negligible</i> to potentially <i>adverse but not significant</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	<i>Negligible</i> to potentially <i>adverse but not significant</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.
Commercial and Recreational Fisheries	Potentially <i>adverse but not significant</i> impact from space-use conflicts (between seismic surveys and longline fisheries) and seismic survey noise (short-term and localized decreases in catchability, not to an extent that would be expected to result in economic losses).	Potentially <i>adverse but not significant</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	Potentially <i>adverse but not significant</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	Potentially <i>adverse but not significant</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.
Coastal and Marine Birds	<i>Negligible</i> impact from seismic surveys (repetitive, intermittent, and localized noise) and aircraft and vessel traffic (noise, disturbance).	<i>Negligible</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	<i>Negligible</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	<i>Negligible</i> . No effect of mitigation; potential for impact remains the same. Limitations: Same as above.
Benthic Communities	<i>Negligible</i> impact from geological and geochemical sampling, anchors, and bottom cables (placement, retrieval) on soft bottom communities, with <i>negligible</i> to potentially <i>adverse but not significant</i> impacts to sensitive benthic communities (if unidentified prior to bottom-related activities). No seismic related impacts. <sup>2</sup>	<i>Negligible</i> (see footnote 2). No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	<i>Negligible</i> (see footnote 2). No effect of mitigation; potential for impact remains the same. Limitations: Same as above.	<i>Negligible</i> (see footnote 2). No effect of mitigation; potential for impact remains the same. Limitations: Same as above.

<sup>1</sup> In water depths  $\geq 200$  m throughout the GOM and Federal waters  $< 200$  m in the Eastern Planning Area, includes ramp-up and visual monitoring per NTL No. 2004-G01; in water depths  $< 200$  m elsewhere, no visual monitoring or ramp-up required.

<sup>2</sup> Negligible impacts to sensitive benthic resources are expected from bottom-related (i.e., seafloor) activities due to existing protective measures and operational restrictions, coupled with proper identification of known sensitive resources; increased impact levels might be realized if sensitive resources remain unidentified (see PEA Section III.G - Benthic Communities).

**Appendix D**  
**Marine Mammals of the Gulf of Mexico**

Table III-3  
Marine Mammals of the Gulf of Mexico

Scientific Name	Common Name	Management Status <sup>1</sup>	Population Status <sup>2</sup>	Scientific Name	Common Name	Management Status <sup>1</sup>	Population Status <sup>2</sup>
<b>ORDER CETACEA</b>	<b>WHALES AND DOLPHINS</b>			Family Delphinidae	Dolphins (Delphinids)		
<b>SUBORDER MYSTICETI</b>	<b>BALEEN WHALES</b>			<i>Stenella frontalis</i>	Atlantic spotted dolphin	none	4
Family Balaenidae	Right whales			<i>Tursiops truncatus</i>	Bottlenose dolphin	none	4
<i>Eubalaena glacialis</i>	Northern right whale	E, S	1	<i>Stenella clymene</i>	Clymene dolphin	none	4
Family Balaenopteridae	Rorquals			<i>Pseudorca crassidens</i>	False killer whale	none	3
<i>Balaenoptera musculus</i>	Blue whale	E, S	1	<i>Lagenodelphis hosei</i>	Fraser's dolphin	none	4
<i>Balaenoptera edeni</i>	Bryde's whale	none	3	<i>Orcinus orca</i>	Killer whale	none	3
<i>Balaenoptera physalus</i>	Fin whale	E, S	2	<i>Peponocephala electra</i>	Melon-headed whale	none	4
<i>Megaptera novaeangliae</i>	Humpback whale	E, S	2	<i>Stenella attenuata</i>	Pantropical spotted dolphin	none	4
<i>Balaenoptera acutorostrata</i>	Minke whale	none	2	<i>Feresa attenuata</i>	Pygmy killer whale	none	3
<i>Balaenoptera borealis</i>	Sei whale	E, S	2	<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	S	4
<b>SUBORDER ODONTOCETI</b>	<b>TOOTHED WHALES/DOLPHINS</b>			<i>Grampus griseus</i>	Risso's dolphin	none	4
Family Physteridae	Sperm whales			<i>Steno bredanensis</i>	Rough-toothed dolphin	none	4
<i>Physeter macrocephalus</i>	Sperm whale	E, S	4	<i>Stenella longirostris</i>	Spinner dolphin	none	4
Family Kogiidae	Pygmy and dwarf sperm whales			<i>Stenella coeruleoalba</i>	Striped dolphin	none	4
<i>Kogia breviceps</i>	Pygmy sperm whale	none	4 <sup>3</sup>	<b>ORDER SIRENIA</b>	<b>DUGONGS AND MANATEES</b>		
<i>Kogia simus</i>	Dwarf sperm whale	none	4 <sup>3</sup>	Family Trichechidae	Manatees		
Family Ziphiidae	Beaked whales			<i>Trichechus manatus latirostris</i>	Florida manatee	E	2 <sup>4</sup>
<i>Mesoplodon densirostris</i>	Blainville's beaked whale	S	2-4 <sup>3</sup>	<i>Trichechus manatus manatus</i>	Antillean manatee	E	2
<i>Ziphius cavirostris</i>	Cuvier's beaked whale	S	2-4 <sup>3</sup>				
<i>Mesoplodon europaeus</i>	Gervais' beaked whale	S	3				
<i>Mesoplodon bidens</i>	Sowerby's beaked whale	S	1				

<sup>1</sup> Management status: E = endangered under the Endangered Species Act of 1973; S = strategic stock under the Marine Mammal Protection Act of 1972, as indicated by Waring et al. (1999).

<sup>2</sup> Population status: 1 = extralimital; 2 = rare; 3 = uncommon; 4 = common (adapted from Würsig et al., 2000).

<sup>3</sup> Determining the population status of Blainville's and Cuvier's beaked whales and dwarf and pygmy sperm whales (*Kogia*), which occur in the Gulf of Mexico, is problematic. Würsig et al. (2000) classify the presence of Blainville's and Cuvier's beaked whales in the Gulf as rare. The National Marine Fisheries Service (NMFS) notes that beaked whales are difficult to identify to species, they are hard to see, and they occur in small groups. In general, only Cuvier's beaked whales and adult male Blainville's beaked whales can be identified in the field. Nevertheless, NMFS suggests that sightings of beaked whales or *Kogia* in the Gulf are not rare or that uncommon. During all NMFS aerial and ship surveys combined, there have been sightings of about 75 beaked whale groups (15 as Cuvier's beaked whale, 36 as *Mesoplodon* spp., 2 as Blainville's beaked whale, and 22 as unidentified ziphiids). While these sightings are widely distributed in the deep waters of the northern Gulf, because they occur in small groups (usually <4 to 6), the abundance of each beaked whale category is low compared with species with a similar number of sightings that occur in much larger groups. Another factor to consider is the sightability of beaked whales and *Kogia*; they rarely leap out of the water or splash at the surface and are difficult to see unless seas are very calm (Beaufort sea state 0, 1). While a quantitative analysis has not been performed, in general, as the sea state decreases, the number of beaked whale sightings increases. The majority of NMFS surveys have been conducted in sea states that are not optimal for sighting beaked whales. Therefore, NMFS suggests that Blainville's and Cuvier's beaked whales are at least uncommon, and depending on how abundance is viewed (group sightings or number of individuals), may in fact along with Gervais' beaked whale, be common. Because of the difficulties distinguishing Gervais' and Blainville's beaked whale, it may be that if one species is truly rare, the other is without doubt common or uncommon. On the basis of the frequency of their sightings, the Marine Mammal Commission considers *Kogia* as common in the northern Gulf.

<sup>4</sup> Excluding the Florida coast, the Florida manatee is considered rare in the northern Gulf of Mexico.

Table 3.1. Population Estimates for Marine Mammal Species in the northern Gulf of Mexico

<u>Species</u>	<u>Population Estimate<sup>1</sup></u>
<u>Killer Whale (<i>Orcinus orca</i>)</u>	133
<u>False Killer Whale (<i>Pseudorca crassidens</i>)</u>	1,038
<u>Pygmy Killer Whale (<i>Feresa attentuata</i>)</u>	408
<u>Dwarf Sperm Whale (<i>Kogia sima</i>)</u>	742a
<u>Pygmy Sperm Whale (<i>Kogia breviceps</i>)</u>	742a
<u>Melon-headed Whale (<i>Peponocephala electra</i>)</u>	3,451
<u>Risso's Dolphin (<i>Grampus griseus</i>)</u>	2,169
<u>Short-finned Pilot Whale (<i>Globicephala macrorhynchus</i>)</u>	2,388
<u>Sperm Whale (<i>Physeter macrocephalus</i>)</u>	1,349
<u>Bryde's Whale (<i>Balaenoptera edeni</i>)</u>	40
<u>Cuvier's Beaked Whale (<i>Ziphius cavirostris</i>)</u>	95
<u>Blainville's Beaked Whale (<i>Mesoplodon densirostris</i>)</u>	106b
<u>Gervais' Beaked Whale (<i>Mesoplodon europaeus</i>)</u>	106b
<u>Bottlenose Dolphin (<i>Turisops truncatus</i>)</u>	27,559 <sup>c</sup>
<u>Atlantic Spotted Dolphin (<i>Stenella frontalis</i>)</u>	30,947
<u>Pantropical Spotted Dolphin (<i>Stenella attenuatus</i>)</u>	91,321
<u>Striped Dolphin (<i>Stenella coeruleoalba</i>)</u>	6,505
<u>Spinner Dolphin (<i>Stenella longirostris</i>)</u>	11,971
<u>Rough-toothed Dolphin (<i>Steno bredanensis</i>)</u>	2,223
<u>Clymene's Dolphin (<i>Stenella clymene</i>)</u>	17,355
<u>Fraser's Dolphin (<i>Lagenodelphis hosei</i>)</u>	726
<u>Absent from Stock Assessment:</u>	
<u>Northern Right Whale (<i>Eubalaena glacialis</i>)</u>	<u>Extralimital</u>
<u>Minke Whale (<i>Balaenoptera acutorostrata</i>)</u>	<u>Rare</u>
<u>Sei Whale (<i>Balaenoptera edeni</i>)</u>	<u>Rare</u>
<u>Blue Whale (<i>Balaenoptera musculus</i>)</u>	<u>Extralimital</u>
<u>Fin Whale (<i>Balaenoptera physalus</i>)</u>	<u>Rare</u>
<u>Humpback Whale (<i>Megaptera novaeangliae</i>)</u>	<u>Rare</u>
<u>Sowerby's Beaked Whale (<i>Mesoplodon bidens</i>)</u>	<u>Extralimital</u>

<sup>1</sup> Source: U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2003 (NOAA, 2004)

<sup>a</sup> This estimate of abundance is for pygmy and dwarf sperm whales combined.

<sup>b</sup> This estimate is based on the undifferentiated complex of beaked whales (*Ziphius* and *Mesoplodon* spp.).

<sup>c</sup> This estimate combines abundance estimates from the Northern Gulf of Mexico Oceanic Stock (2, 239) and Continental Shelf Stock (25,320).

Extralimital: known on the basis of only a few records that probably resulted from unusual wanderings of animals into the region (Würsig et al. 2000).

Rare: present in such small numbers throughout the region that it is seldom seen (Würsig et al. 2000).