OCS EIS/EA
BOEM 2016-061

Gulf of Mexico OCS Oil and Gas Lease Sale: 2017

Central Planning Area Lease Sale 247

Final Supplemental Environmental Impact Statement

U.S. Department of the Interior
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

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REGIONAL DIRECTOR'S NOTE

This Supplemental Environmental Impact Statement (EIS) addresses one proposed Federal action: proposed Outer Continental Shelf (OCS) oil and gas Lease Sale 247 in the Central Planning Area (CPA) of the Gulf of Mexico, as scheduled in the *Proposed Final Outer Continental Shelf Oil & Gas Leasing Program: 2012-2017* (Five-Year Program) (USDOI, BOEM, 2012a). This Supplemental EIS incorporates by reference all of the relevant material in the "prior 2012-2017 Gulf of Mexico EISs" from which it tiers: *Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; Central Planning Area Lease Sales 227, 231, 235, 241, and 247, Final Environmental Impact Statement* (2012-2017 WPA/CPA Multisale EIS) (USDOI, BOEM, 2012b); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231, Final Supplemental Environmental Impact Statement* (WPA 233/CPA 231 Supplemental EIS) (USDOI, BOEM, 2013a); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2015-2017; Central Planning Area Lease Sales 235, 241, and 247, Final Supplemental Environmental Impact Statement* (CPA 235/241/247 Supplemental EIS) (USDOI, BOEM, 2014a); and *Gulf of Mexico OCS Oil and Gas Lease Sales: 2016 and 2017; Central Planning Area Lease Sales 241 and 247; Eastern Planning Area Lease Sale 226, Final Supplemental Environmental Impact Statement* (CPA 241/247 and EPA 226 Supplemental EIS) (USDOI, BOEM, 2015a).

The prior 2012-2017 Gulf of Mexico EISs analyzed the potential impacts of a CPA proposed action on the marine, coastal, and human environments. It is important to note that the prior 2012-2017 Gulf of Mexico EISs were prepared using the best information that was publicly available at the time they were prepared. This Supplemental EIS is deemed appropriate to supplement the documents cited above for proposed CPA Lease Sale 247 in order to consider new circumstances and information arising from, among other things, the *Deepwater Horizon* explosion, oil spill, and response. This Supplemental EIS's analyses focus on updating the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs. This Supplemental EIS will also assist decisionmakers in making informed, future decisions regarding the approval of operations, as well as leasing. This Supplemental EIS is the final National Environmental Policy Act (NEPA) review conducted for proposed CPA Lease Sale 247.

BOEM's Gulf of Mexico OCS Region and its predecessors have been conducting environmental analyses of the effects of OCS oil and gas development since the inception of NEPA. We have prepared and published more than 50 draft and 50 final EISs. Our goal has always been to provide factual, reliable, and clear analytical statements in order to inform decisionmakers and the public about the environmental effects of proposed OCS oil- and gas-related activities and their alternatives. We view the EIS process as providing a balanced forum for early identification, avoidance, and resolution of potential conflicts. It is in this spirit that we welcome comments on this document from all concerned parties.

Michael A. Celata
Regional Director
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

COVER SHEET

Supplemental Environmental Impact Statement
for
Proposed Central Planning Area Lease Sale 247

	Draft ( )	**Final (x)**
Type of Action:	Administrative (x)	Legislative ( )

Area of Potential Impact: Offshore Marine Environment and Coastal Parishes/Counties of Louisiana, Mississippi, Alabama, and Florida

Agency	Headquarters' Contact	Region Contacts
U.S. Department of the Interior Bureau of Ocean Energy Management Gulf of Mexico OCS Region (GM 623E) 1201 Elmwood Park Boulevard New Orleans, LA 70123-2394	Geoffrey Wikel (355-C1) U.S. Department of the Interior Bureau of Ocean Energy Management 45600 Woodland Road Sterling, VA 20166 703-787-1283	Trevis Olivier 504-736-5713 Gary D. Goeke 504-736-3233

ABSTRACT

This Supplemental Environmental Impact Statement (EIS) addresses one proposed Federal action: proposed Outer Continental Shelf (OCS) oil and gas Lease Sale 247 in the Central Planning Area (CPA) of the Gulf of Mexico, as scheduled in the *Proposed Final Outer Continental Shelf Oil & Gas Leasing Program: 2012-2017* (Five-Year Program) (USDOI, BOEM, 2012a).

This Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the "prior 2012-2017 Gulf of Mexico EISs": *Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; Central Planning Area Lease Sales 227, 231, 235, 241, and 247, Final Environmental Impact Statement* (2012-2017 WPA/CPA Multisale EIS) (USDOI, BOEM, 2012b); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231, Final Supplemental Environmental Impact Statement* (WPA 233/CPA 231 Supplemental EIS) (USDOI, BOEM, 2013a); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2015-2017; Central Planning Area Lease Sales 235, 241, and 247, Final Supplemental Environmental Impact Statement* (CPA 235/241/247 Supplemental EIS) (USDOI, BOEM, 2014a); and *Gulf of Mexico OCS Oil and Gas Lease Sales: 2016 and 2017; Central Planning Area Lease Sales 241 and 247; Eastern Planning Area Lease Sale 226, Final Supplemental Environmental Impact Statement* (CPA 241/247 and EPA 226 Supplemental EIS).

This Supplemental EIS analyzes the potential impacts of the CPA proposed action on sensitive coastal environments, offshore marine resources, and socioeconomic resources both onshore and offshore. It is important to note that this Supplemental EIS was prepared using the best information that was publicly available at the time the document was prepared. Where relevant information on reasonably foreseeable significant adverse impacts is incomplete or unavailable, the need for the information was evaluated to determine if it was essential to a reasoned choice among the alternatives and if so, was either acquired or in the event it was impossible or exorbitant to acquire the information, accepted scientific methodologies were applied in its place.

The proposed action is considered to be a major Federal action requiring an EIS. This document provides the following information in accordance with the National Environmental Policy Act (NEPA)

and its implementing regulations, and it will be used in making decisions on the proposal. This Supplemental EIS is the final NEPA review conducted for proposed CPA Lease Sale 247. This document includes the purpose and background of the CPA proposed action, identification of the alternatives, description of the affected environment, and an analysis of the potential environmental impacts of the CPA proposed action, alternatives, and associated activities, including proposed mitigating measures and their potential effects. Potential contributions to cumulative impacts resulting from activities associated with the CPA proposed action are also analyzed.

Hypothetical scenarios were developed on the levels of activities, accidental events (such as oil spills), and potential impacts that might result if the CPA proposed action is adopted. Activities and disturbances associated with the CPA proposed action on biological, physical, and socioeconomic resources are considered in the analyses.

Additional copies of this Supplemental EIS, the prior 2012-2017 Gulf of Mexico EISs, and the other referenced publications may be obtained from the Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, Public Information Office (GM 250C), 1201 Elmwood Park Boulevard, Room 250, New Orleans, Louisiana 70123-2394, by telephone at 504-736-2519 or 1-800-200-GULF, or on BOEM's website at http://www.boem.gov/nepaprocess/.

SUMMARY

This Supplemental Environmental Impact Statement (EIS) addresses one proposed Federal action that offers for lease an area on the Gulf of Mexico Outer Continental Shelf (OCS) that may contain economically recoverable oil and gas resources. Under the *Proposed Final Outer Continental Shelf Oil & Gas Leasing Program*: *2012-2017* (Five-Year Program), five proposed lease sales are scheduled for the Central Planning Area (CPA) (USDOI, BOEM, 2012a). The remaining proposed CPA lease sale is proposed CPA Lease Sale 247, which is tentatively scheduled to be held in March 2017. At the completion of this Supplemental EIS process, a decision will be made on whether or how to proceed with proposed CPA Lease Sale 247.

This Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the "prior 2012-2017 Gulf of Mexico EISs": *Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; Central Planning Area Lease Sales 227, 231, 235, 241, and 247, Final Environmental Impact Statement* (2012-2017 WPA/CPA Multisale EIS) (USDOI, BOEM, 2012b); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231, Final Supplemental Environmental Impact Statement* (WPA 233/CPA 231 Supplemental EIS) (USDOI, BOEM, 2013a); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2015-2017; Central Planning Area Lease Sales 235, 241, and 247, Final Supplemental Environmental Impact Statement* (CPA 235/241/247 Supplemental EIS) (USDOI, BOEM, 2014a); and *Gulf of Mexico OCS Oil and Gas Lease Sales: 2016 and 2017; Central Planning Area Lease Sales 241 and 247; Eastern Planning Area Lease Sale 226, Final Supplemental Environmental Impact Statement* (CPA 241/247 and EPA 226 Supplemental EIS) (USDOI, BOEM, 2015a).

This Supplemental EIS analyzes the potential impacts of the CPA proposed action on sensitive coastal environments, offshore marine resources, and socioeconomic resources both onshore and offshore. It is important to note that this Supplemental EIS was prepared using the best information that was publicly available at the time this document was prepared. Where relevant information on reasonably foreseeable significant adverse impacts is incomplete or unavailable, the need for the information was evaluated to determine if it was essential to a reasoned choice among the alternatives and if so, it was either acquired or in the event it was impossible or exorbitant to acquire the information, accepted scientific methodologies were applied in its place.

This summary section provides only a brief overview of the proposed CPA lease sale, alternatives, significant issues, potential environmental and socioeconomic effects, and proposed mitigating measures contained in this Supplemental EIS. To obtain the full perspective and context of the potential environmental and socioeconomic impacts discussed, it is necessary to read the entire Supplemental EIS. Relevant discussions of specific topics can be found in the chapters and appendices of this Supplemental EIS as described below.

- **Chapter 1**, The Proposed Action, describes the purpose of and need for the proposed lease sale, the prelease process, postlease activities, and other OCS oil- and gas-related activities.
- **Chapter 2**, Alternatives Including the Proposed Action, describes the environmental and socioeconomic effects of the proposed CPA lease sale and alternatives. It also discusses the potential mitigating measures to avoid or minimize impacts.
- **Chapter 3**, Impact-Producing Factors and Scenario, describes the activities associated with a proposed lease sale and the OCS Program, and other foreseeable activities that could potentially affect the biological, physical, and socioeconomic resources of the Gulf of Mexico.

  Chapter 3.1, Impact-Producing Factors and Scenario—Routine Operations, describes offshore infrastructure and routine activities (impact-producing factors) associated with a proposed lease sale that could potentially affect the biological, physical, and socioeconomic resources of the Gulf of Mexico.

Chapter 3.2, Impact-Producing Factors and Scenario—Accidental Events, discusses potential accidental events (i.e., oil spills, losses of well control, vessel collisions, and spills of chemicals or drilling fluids) that may occur as a result of activities associated with a proposed lease sale.

Chapter 3.3, Cumulative Activities Scenario, describes past, present, and reasonably foreseeable future human activities, including non-OCS oil- and gas-related activities, as well as all OCS oil- and gas-related activities, that may affect the biological, physical, and socioeconomic resources of the Gulf of Mexico.

- **Chapter 4**, Description of the Environment and Impact Analysis, describes the affected environment and provides analysis of the routine activities, accidental events, and cumulative impacts of the CPA proposed action and the alternatives on environmental and socioeconomic resources of the Gulf of Mexico.

  Chapter 4.1, Proposed Central Planning Area Lease Sale 247, describes the routine activities, accidental events, and cumulative impacts of the CPA proposed action and two alternatives to the CPA proposed action on the biological, physical, and socioeconomic resources of the Gulf of Mexico..

  Chapter 4 also includes **Chapter 4.2**, Unavoidable Adverse Impacts of the Proposed Action; **Chapter 4.3**, Irreversible and Irretrievable Commitment of Resources; and **Chapter 4.4**, Relationship Between the Short-term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity.

- **Chapter 5**, Consultation and Coordination, describes the consultation and coordination activities with Federal, State, and local agencies and other interested parties that occurred during the development of this Supplemental EIS.
- **Chapter 6**, References Cited, is a list of literature cited throughout this Supplemental EIS.
- **Chapter 7**, Preparers, is a list of names of persons who were primarily responsible for preparing and reviewing this Supplemental EIS.
- **Chapter 8**, Glossary, is a list of definitions of selected terms used in this Supplemental EIS.
- **Appendix A**, Memorandum of Agreement Between the Bureau of Ocean Energy Management and the National Park Service, outlines the responsibilities of BOEM and the National Park Service for this Supplemental EIS.
- **Appendix B,** Catastrophic Spill Event Analysis, is a technical analysis of a potential low-probability catastrophic event to assist BOEM in meeting the Council on Environmental Quality's requirements for evaluating low-probability catastrophic events under NEPA and to provide the public and decisionmaker with an understanding of the potential impacts that could result should such an event occur. A catastrophic spill event is a low-probability event that is not reasonably expected to occur and not part of the CPA proposed action or reasonably foreseeable accidental events.
- **Keyword Index** is a list of descriptive terms and the pages on which they can be found in this Supplemental EIS.

Proposed Actions and Alternatives

The following alternatives were included for analysis in this Supplemental EIS.

Alternatives for Proposed Central Planning Area Lease Sale 247

Alternative A—The Proposed Action (Preferred Alternative): This alternative would offer for lease all unleased blocks within the proposed CPA lease sale area for oil and gas operations (**Figure 2-1**), with the following exceptions:

(1) whole and portions of blocks deferred by the Gulf of Mexico Energy Security Act of 2006; and

(2) blocks that are adjacent to or beyond the United States' Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap.

The U.S. Department of the Interior (DOI) is conservative throughout the NEPA process and includes the total area within the CPA for environmental review even though the leasing of portions of the CPA (subareas or blocks) can be deferred during a Five-Year Program.

The proposed CPA lease sale area encompasses about 63 million acres (ac) of the CPA's 66.45 million ac. As of August 2016, approximately 47.39 million ac of the proposed CPA lease sale area are currently unleased. This information is updated monthly and can be found on BOEM's website at http://www.boem.gov/Gulf-of-Mexico-Region-Lease-Map/. The estimated amount of natural resources projected to be developed as a result of a proposed CPA lease sale is 0.460-0.894 billion barrels of oil (BBO) and 1.939-3.903 trillion cubic feet (Tcf) of gas (**Table 3-1**).

Alternative A has been identified as BOEM's preferred alternative; however, this does not mean that a different alternative may not be selected in the Record of Decision.

Alternative B—Exclude the Blocks Subject to the Topographic Features Stipulation: This alternative would offer for lease all unleased blocks within the proposed CPA lease sale area, as described for the proposed action (Alternative A), but it would exclude from leasing any unleased blocks subject to the Topographic Features Stipulation. The estimated amount of resources projected to be developed is 0.460-0.894 BBO and 1.939-3.903 Tcf of gas.

Alternative C—No Action: This alternative is the cancellation of the proposed CPA lease sale. If this alternative is chosen, the opportunity for development of the estimated 0.460-0.894 BBO and 1.939-3.903 Tcf of gas that could have resulted from the proposed CPA lease sale would be precluded during the current 2012-2017 Five-Year Program, but it could again be contemplated as part of a future Five-Year Program. Any potential environmental impacts arising out of the proposed CPA lease sale would not occur, but activities associated with existing leases in the CPA would continue.

Mitigating Measures

Proposed lease stipulations and other mitigating measures designed to reduce or eliminate environmental risks and/or potential multiple-use conflicts between OCS operations and U.S. Department of Defense activities may be applied to the chosen alternative. Ten lease stipulations are proposed for a CPA proposed lease sale—the Topographic Features Stipulation; Live Bottom (Pinnacle Trend) Stipulation; Military Areas Stipulation; Evacuation Stipulation; Coordination Stipulation; Blocks South of Baldwin County, Alabama, Stipulation; Protected Species Stipulation; United Nations Convention on the Law of the Sea Royalty Payment Stipulation; Below Seabed Operations Stipulation; and the Stipulation on the Agreement between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico. The United Nations Convention on the Law of the Sea Royalty Payment Stipulation is applicable to the proposed CPA lease sale even though it is not an environmental or military stipulation.

Application of lease stipulations will be considered by the Assistant Secretary of the Interior for Land and Minerals (ASLM). The inclusion of the stipulations as part of the analysis of the CPA proposed action does not ensure that the ASLM will make a decision to apply the stipulations to leases that may result from the proposed lease sale, nor does it preclude minor modifications in wording during

subsequent steps in the prelease process if comments indicate changes are necessary or if conditions warrant. Any lease stipulations or mitigating measures to be included in a lease sale will be described in the Final Notice of Sale. Mitigating measures in the form of lease stipulations are added to the lease terms and are therefore enforceable as part of the lease. In addition, mitigations may be added to plans and/or permits for OCS oil- and gas-related activities. For more information on mitigating measures that are added at the postlease stage, refer to Appendix A ("Commonly Applied Mitigating Measures") of the CPA 241/247 and EPA 226 Supplemental EIS, which is hereby incorporated by reference. A detailed listing of the current Gulf of Mexico OCS Region's Notices to Lessees and Operators (NTLs) is available through BOEM's Gulf of Mexico OCS Region's website at http://boem.gov/Regulations/Notices-Letters-and-Information-to-Lessees-and-Operators.aspx or through the Region's Public Information Office at 504-736-2519 or 1-800-200-GULF.

Scenarios Analyzed

Offshore activities are described in the context of scenarios for the CPA proposed action (**Chapter 3.1**) and for the OCS Program (**Chapter 3.3**). BOEM's Gulf of Mexico OCS Region developed these scenarios to provide a framework for detailed analyses of potential impacts of the proposed CPA lease sale. The scenarios are presented as ranges of the amounts of undiscovered, unleased hydrocarbon resources estimated to be leased and discovered as a result of the CPA proposed action. The analyses are based on a traditionally employed range of activities (e.g., the installation of platforms, wells, and pipelines, and the number of helicopter operations and service-vessel trips) that would be needed to develop and produce the amount of resources estimated to be leased.

The cumulative analyses (**Chapters 4.1**) consider environmental and socioeconomic impacts that may result from the incremental contribution of the CPA proposed action when added to all past, present, and reasonably foreseeable future activities, including non-OCS oil- and gas-related activities such as import tankering and commercial fishing, as well as all OCS oil- and gas-related activities (OCS Program). The OCS Program scenario includes all activities that are projected to occur from past, proposed, and future lease sales during the 40-year analysis period (2012-2051). This includes projected activity from lease sales that have been held, but for which exploration or development has not yet begun or is continuing. In addition to human activities, impacts from natural occurrences, such as hurricanes, are analyzed.

Significant Issues

The major issues that frame the environmental analyses in this Supplemental EIS and in the prior 2012-2017 Gulf of Mexico EISs are the result of concerns raised during years of scoping for the Gulf of Mexico OCS Program. Issues related to OCS oil and gas exploration, development, production, and transportation activities include the potential for oil spills, wetlands loss, air emissions, discharges, water quality degradation, trash and debris, structure and pipeline emplacement activities, platform removal, vessel and helicopter traffic, multiple-use conflicts, support services, population fluctuations, demands on public services, land-use planning, impacts to tourism, aesthetic interference, cultural impacts, environmental justice, and conflicts with State coastal zone management programs. Environmental resources and activities identified during the scoping process that warrant environmental analyses include air quality, water quality, coastal barrier beaches and associated dunes, wetlands, seagrass communities, live bottoms, topographic features, *Sargassum* communities, deepwater benthic communities, soft bottom benthic communities, marine mammals, sea turtles, diamondback terrapins, beach mice, coastal and marine birds, Gulf sturgeon, fish resources and essential fish habitat, commercial fisheries, recreational fishing, recreational resources, archaeological resources, and socioeconomic conditions.

Other relevant issues include impacts from the *Deepwater Horizon* explosion, oil spill, and response; impacts from past and future hurricanes on environmental and socioeconomic resources; and impacts on coastal and offshore infrastructure. During the past few years, both the Gulf Coast States and Gulf of Mexico oil and gas activities have been impacted by major hurricanes. The description of the affected environment (**Chapter 4.1**) includes impacts from these storms on the physical environment, biological environment, and socioeconomic activities and on OCS oil- and gas-related infrastructure. This Supplemental EIS also considers baseline data in the assessment of impacts from the CPA proposed action on the resources and the environment (**Chapter 4.1**).

Impact Conclusions

The full analyses of the potential impacts of routine activities and accidental events associated with the CPA proposed action and the proposed action's incremental contribution to the cumulative impacts are described in **Chapter 4.1**. A summary of the potential impacts from the CPA proposed action on each environmental and socioeconomic resource and the conclusions of the analyses can be found below.

Air Quality: Emissions of pollutants into the atmosphere from the routine activities associated with a CPA proposed action exceed the U.S. Environmental Protection Agency's Significant Impact Levels (SILs) for annual nitrogen dioxide (NO_2) (0.1 micron per cubic meter [μ/m^3]) and 24-hour particulate matter of 2.5 microns or less ($PM_{2.5}$) (0.07 μ/m^3) in the Class I area. The results of the impacts equal annual NO_2 (0.4 μ/m^3) and 24-hour $PM_{2.5}$ (0.3 μ/m^3) in the Class I area. However, onshore impacts on air quality from emissions from OCS oil- and gas-related activities are estimated to be within the Prevention of Significant Deterioration (PSD) Class II allowable increments. The background concentration and the impact concentration are below the National Ambient Air Quality Standards (NAAQS). While regulations are in place to reduce the risk of impacts from hydrogen sulfide (H_2S) and while no H_2S-related deaths have occurred on the OCS, accidents involving high concentrations of H_2S could result in deaths as well as environmental damage. Emissions from routine activities and accidental events associated with the CPA proposed action are not expected to occur at concentrations that would change onshore air quality classifications.

Water Quality (Coastal and Offshore Waters): Impacts from routine activities associated with the CPA proposed action would be minimal if all existing regulatory requirements are met and because of the distance to shore of most routine activities. Coastal water impacts associated with routine activities include increases in turbidity resulting from pipeline installation and navigation canal maintenance, discharges of bilge and ballast water from support vessels, and run-off from shore-based facilities. Offshore water impacts associated with routine activities result from the discharge of drilling muds and cuttings, produced water, residual chemicals used during workovers, structure installation and removal, and pipeline placement. The discharge of drilling muds and cuttings causes temporary increased turbidity and changes in sediment composition. The discharge of produced water results in increased concentrations of some metals, hydrocarbons, and dissolved solids within an area of about 100 meters (m) (328 feet [ft]) adjacent to the point of discharge. Structure installation and removal and pipeline placement disturb the sediments and cause increased turbidity. In addition, offshore water impacts result from supply and service-vessel bilge and ballast water discharges. The potential impacts from accidental events (primarily oil spills) associated with the CPA proposed action is anticipated to be minimal.

Coastal Barrier Beaches and Associated Dunes: Routine activities associated with the CPA proposed action, such as increased vessel traffic, maintenance dredging of navigation canals, and pipeline installation, is not expected to cause significant impacts. Such impacts would be expected to be restricted to temporary and localized disturbances and not deleteriously affect barrier beaches and associated dunes. Indirect impacts from routine activities are negligible and indistinguishable from direct impacts of inshore activities. The potential impacts from accidental events (primarily oil spills) associated with the CPA proposed action are anticipated to be minor. Should a spill (other than a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur) contact a barrier beach, oiling is expected to be light and sand removal during cleanup activities minimized. No significant long-term impacts to the physical shape and structure of barrier beaches and associated dunes are expected to occur as a result of the CPA proposed action.

Wetlands: Routine activities associated with the CPA proposed action are expected to be small, localized, and temporary due to the small length of projected onshore pipelines, the minimal contribution to the need for maintenance dredging, the disposal of OCS wastes, and the mitigating measures that would be used to further reduce these impacts. Indirect impacts from wake erosion and saltwater intrusion resulting from a single lease sale are expected to result in low impacts that are indistinguishable from direct impacts from inshore activities. Accidental disturbances resulting from the CPA proposed action, mainly oil spills, have the potential to cause plant mortality and permanent loss of wetlands of the CPA. The potential impacts from accidental events (primarily oil spills originating in the OCS) would have a low probability of contacting and damaging wetlands along the Gulf Coast. Overall, impacts to wetland habitats from an oil spill associated with activities related to the CPA proposed action would be expected to be small and temporary because of the small contribution of the CPA proposed action to the

total OCS activity, the distance of most of the activity from shore, the weathering of spilled oil, and the ability of vegetation to recover from exposure to crude oil.

Seagrass Communities: Turbidity impacts from pipeline installation and maintenance dredging associated with the CPA proposed action would be temporary and localized. The increment of impacts from service-vessel transit associated with the CPA proposed action would be minimal. Should an oil spill occur near a seagrass community, impacts from the spill and cleanup would be considered short term in duration and minor in scope. Close monitoring and restrictions on the use of bottom-disturbing equipment to clean up the spill would be needed to avoid or minimize those impacts.

Live Bottoms (Pinnacle Trend and Low Relief): The combination of its depth (200-400 ft; 60-120 m), separation from sources of impacts as mandated by the Live Bottom (Pinnacle Trend) Stipulation and through site-specific seafloor reviews of proposed activity, and a community adapted to sedimentation makes damage to the ecosystem unlikely from routine activities associated with the CPA proposed action. In the unlikely event that oil from a subsurface spill would reach the biota of these communities, the effects would be primarily sublethal for adult sessile biota. Although unlikely, high concentrations of surface oil have the potential to impact live bottoms. A recent publication of data related to the apparent mixing of surface waters to a depth of at least 75 m (246 ft) in the Pinnacle Trend area during the passage of Tropical Storm Bonnie in July 2010 (Silva et al., 2015) documented acute impacts to gorgonians and black corals, seemingly caused by acute exposure to high concentrations of surface oil and/or dispersant (presumably sourced from the *Deepwater Horizon*). The submerged oil and/or dispersant likely reached the live bottom features in relatively undiluted concentrations, leading to lethal and sublethal impacts.

Topographic Features: The routine activities associated with the CPA proposed action that could impact topographic feature communities include anchoring, infrastructure and pipeline emplacement, infrastructure removal, drilling discharges, and produced-water discharges. However, adherence to the proposed Topographic Features Stipulation would make damage to the ecosystem unlikely. Contact with accidentally spilled oil could cause lethal and sublethal effects in benthic organisms, but the oiling of benthic organisms is not likely because of the small area of the banks, the scattered occurrence of spills, the depth of the features, and because the proposed Topographic Features Stipulation, if applied, would keep subsurface sources of spills away from the immediate vicinity of topographic features. Although very unlikely, the results of a new study suggest that high concentrations of surface oil, when combined with extreme mixing from storm events, have the potential to impact topographic features. A recent study documented the apparent mixing of surface waters to a depth similar to that of the topographic features during the passage of Tropical Storm Bonnie (Silva et al., 2015). This apparent mixing appears to have resulted in surface oil reaching the benthic community of mesophotic reefs in concentrations high enough to damage the corals. Damage was determined through the detection of necrotic tissues, biofilms, and chemical analysis. Many of these reefs have similar communities and are found at similar depths, as are most topographic features. As such, if a large storm event did occur in the Gulf and it passed over a topographic feature while there was a substantial amount of surface oil present, impacts to the benthic community could be expected.

Sargassum Communities: The impacts that are associated with the CPA proposed action are expected to have only minor effects to a small portion of the *Sargassum* community as a whole. Limited portions of the *Sargassum* community could suffer mortality if it contacts spilled oil or cleanup activities. The *Sargassum* community lives in pelagic waters with generally high water quality and would be resilient to the minor effects predicted. It has a yearly cycle that promotes quick recovery from impacts. No measurable impacts are expected to the overall population of the *Sargassum* community from the CPA proposed action.

Chemosynthetic and Nonchemosynthetic Deepwater Benthic Communities: Chemosynthetic and nonchemosynthetic communities are susceptible to physical impacts from structure placement, anchoring, and pipeline installation associated with the CPA proposed action. However, the protective measures provided as guidance by NTL 2009-G40 greatly reduce the risk of these physical impacts by clarifying the measures that must be taken to ensure avoidance of potential chemosynthetic communities and, by consequence, avoidance of other hard bottom communities. Even in situations where substantial burial of typical benthic infaunal communities occurred, recolonization by populations from widespread, neighboring, soft bottom substrate would be expected over a relatively short period of time for all size ranges of organisms. Potential accidental events associated with the CPA proposed action are expected to cause little damage to the ecological function or biological productivity of the widespread, low-density chemosynthetic communities and the widespread, typical, deep-sea benthic communities.

Soft Bottom Benthic Communities: The routine activities associated with the CPA proposed action that could impact soft bottoms generally occur within a few hundred meters of platforms, and the greatest impacts are seen close to the platform communities. Accidental disturbances to soft bottom benthic communities can result from oil spills associated with OCS oil- and gas-related activities. Oil deposited on soft bottom benthic communities could result in changes to local community structure. Although localized impacts to comparatively small areas of the soft bottom benthic communities would occur, the CPA proposed action is not expected to adversely impact the entire soft bottom environment because the locally impacted areas are extremely small compared with the entire seafloor of the Gulf of Mexico and because the soft bottom benthic communities are ubiquitous throughout the Gulf of Mexico.

Marine Mammals: Routine events (i.e., vessel traffic, degradation of water quality from operational discharges, and marine debris from service vessels and OCS oil- and gas-related facilities) related to a the CPA proposed action are not expected to have adverse effects on the quality and productivity of any marine mammal species or population stocks in the Gulf of Mexico. Impacts from operations and equipment noise, vessel and aircraft noise, structure removals, and geological and geophysical activity could negatively impact marine mammals by increasing noise levels, as well as having the potential to harm or harass marine mammal species. These activities, when mitigated, are not expected to have long-term impacts on the quality and productivity of any marine mammal species or population stocks. Characteristics of impacts from accidental events depend on chronic or acute exposure from accidental events resulting in harassment, harm, or mortality to marine mammals. Accidental disturbances resulting from the CPA proposed action, including oil spills and spill-response activities, have the potential to have adverse, but not significant, impacts on marine mammal populations of the CPA.

Sea Turtles: Routine activities resulting from the CPA proposed action have the potential to harm sea turtles, although this potential is unlikely to rise to a level of significance due to the activity already present in the Gulf of Mexico and due to mitigating measures that are in place. Accidental events, including accidental oil spills and spill-response activities, associated with the CPA proposed action have the potential to impact small to large numbers of sea turtles. Populations of sea turtles in the Gulf of Mexico may be exposed to residuals of oils spilled as a result of the CPA proposed action during their lifetimes. While chronic or acute exposure from accidental events may result in the harassment, harm, or mortality of sea turtles, in the most likely scenarios, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick are expected to most often result in sublethal impacts (e.g., decreased health and/or reproductive fitness and increased vulnerability to disease) to sea turtles. The incremental contribution of the CPA proposed action would not be likely to result in a significant incremental impact on sea turtles within the CPA; in comparison, non-OCS energy-related activities, such as overexploitation, commercial fishing, and pollution, have historically proved to be a greater threat to sea turtles.

Diamondback Terrapins: The routine activities of the CPA proposed action are unlikely to have significant adverse effects on the size and recovery of terrapin species or populations in the Gulf of Mexico. Impacts on diamondback terrapins from smaller accidental events are likely to affect individual diamondback terrapins in the spill area, but they are unlikely to rise to the level of population effects (or significance) given the probable size and scope of such spills. Due to the distance of most terrapin habitat from offshore OCS energy-related activities, impacts associated with activities occurring as a result of the CPA proposed action are not expected to impact terrapins or their habitat. The incremental effect of the CPA proposed action on diamondback terrapin populations is not expected to be significant when compared with historic and current non-OCS energy-related activities, such as habitat loss, overharvesting, crabbing, and fishing.

Beach Mice: An impact from the consumption of beach trash and debris associated with the CPA proposed action on the Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice is possible but unlikely. While potential spills that could result from the CPA proposed action are not expected to contact beach mice or their habitats, if either or both of these organisms and locations were to experience large-scale oiling, beach mice could go extinct. Also, if all personnel are not thoroughly trained, oil-spill response and cleanup activities could have a significant impact to the beach mice and their habitat.

Coastal and Marine Birds: The majority of impacts that may result from routine activities associated with the CPA proposed action on avian species (Endangered Species Act listed and nonlisted) are expected to be adverse, but not significant. These impacts include behavioral effects, exposure to or intake of OCS oil- and gas-related contaminants and discarded debris, disturbance-related impacts, and displacement of birds from habitats that are destroyed, altered, or fragmented, making these areas

otherwise unavailable. Impacts from potential oil spills associated with the CPA proposed action and the effects related to oil-spill cleanup are expected to be adverse, but not significant. Oil spills, irrespective of size, can result in some mortality as well as sublethal, chronic short- and long-term effects, in addition to potential impacts to food resources. The effect of cumulative activities on coastal and marine birds is expected to result in discernible changes to avian species' composition, distribution, and abundance. The incremental contribution of the CPA proposed action to cumulative impacts is expected to be adverse, but not significant, because it may seriously alter avian species' composition and abundance due to reductions in the overall carrying capacity of disturbed habitats, and possibly to the availability, abundance, and distribution of preferred food resources.

Gulf Sturgeon: Routine activities associated with the CPA proposed action, such as the installation of pipelines, maintenance dredging, potential vessel strikes, and nonpoint-source runoff from onshore facilities, would cause negligible impacts due to the distance of the Gulf sturgeon habitat and life cycles from most activities related to the CPA proposed action and would not deleteriously affect Gulf sturgeon. Indirect impacts from routine activities to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities and are further reduced through mitigations and regulations. The potential impacts from accidental events, mainly oil spills associated with the CPA proposed action, are anticipated to be minimal. Because of the floating nature of oil, reduced toxicity through weathering (offshore dispersant treatment), and the small tidal range of the Gulf of Mexico, oil spills alone would typically have very little impact on benthic feeders such as the Gulf sturgeon. The incremental contribution of the CPA proposed action to the cumulative impact is negligible.

Fish Resources and Essential Fish Habitat: Fish resources and essential fish habitat could be impacted by coastal environmental degradation potentially caused by canal dredging, increases in infrastructure, and inshore spills and marine environmental degradation possibly caused by pipeline trenching, offshore discharges, and offshore spills. Impacts of routine dredging and discharges are localized in time and space and are regulated by Federal and State agencies through permitting processes; therefore, there would be minimal impact to fish resources and essential fish habitat from these routine activities associated with the CPA proposed action. Accidental events that could impact fish resources and essential fish habitat include oil or chemical spills. If a spill were to occur as a result of the CPA proposed action and if it was proximate to mobile fishes, the impacts of the spill would depend on multiple factors, including the amount spilled, the areal extent of the spill, the distance of the spill from particular essential fish habitats (e.g., nursery habitats), and the type and toxicity of oil spilled. Much of the sensitive essential fish habitat would have decreased effects from oil spills because of the depths many are found and because of the distance that these low-probability spills would occur from many of the essential fish habitats (due to stipulations, NTLs, Magnuson-Stevens Fishery Conservation and Management Act compliance, etc.). If there is an effect of an oil spill on fish resources in the Gulf of Mexico, it is expected to cause a minimal decrease in standing stocks of any population. This is because most spill events would be localized, therefore affecting a small portion of fish populations.

Commercial Fisheries: Routine activities in the CPA, such as seismic surveys and pipeline trenching, could cause short-term localized disturbances that minimally impact commercially valuable fish species and associated essential fish habitat. Indirect impacts from routine activities to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities on commercial fisheries. The potential impacts from accidental events, such as an oil spill, associated with the CPA proposed action are anticipated to be minimal. Commercial fishermen are anticipated to avoid the area of an oil spill. Large spills may impact commercial fisheries by area closures. The extent of impact depends on the areal extent and length of the closure. The impact of spills on catch or value of catch would depend on the volume and location (i.e., distance from shore) of the spill, as well as the physical properties of the oil spilled.

Recreational Fishing: There could be minor and short-term, space-use conflicts with recreational fishermen during the initial phases of the CPA proposed action. The CPA proposed action could also lead to low-level environmental degradation of fish habitat, which could also negatively impact recreational fishing activity. However, these minor negative effects would be offset by the beneficial role that oil platforms serve as artificial reefs for fish populations. An oil spill would likely lead to recreational fishing closures the CPA proposed action and not likely expected (e.g., the *Deepwater Horizon* oil spill), oil spills should not affect recreational fishing to a large degree due to the likely availability of substitute fishing sites in neighboring regions.

Recreational Resources: Routine OCS oil- and gas-related activities can cause minor disturbances to recreational resources, particularly beaches, through increased levels of noise, debris, and rig visibility.

The oil spills most likely to result from the CPA proposed action would be small, of short duration, and not likely to impact Gulf Coast recreational resources. Should an oil spill occur and contact a beach area or other recreational resource, it would cause some disruption during the impact and cleanup phases of the spill. However, except for a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected (e.g., the *Deepwater Horizon* oil spill), these effects are likely to be small in scale and of short duration.

Archaeological Resources (Historic and Prehistoric): The greatest potential impact to an archaeological resource as a result of routine activities associated with the CPA proposed action would result from direct contact between an offshore activity (e.g., platform installation, drilling rig emplacement, structure removal or site clearance operation, and dredging or pipeline project) and a historic or prehistoric site. The archaeological survey and archaeological clearance of sites, where required prior to an operator beginning OCS oil- and gas-related activities on a lease, are expected to be highly effective at identifying possible offshore archaeological sites; however, should such contact occur, there would be localized damage to or loss of significant and/or unique archaeological information. It is expected that coastal archaeological resources would be protected through the review and approval processes of the various Federal, State, and local agencies involved in permitting onshore activities.

It is not very likely that a large oil spill would occur and contact coastal prehistoric or historic archaeological sites from accidental events associated with the CPA proposed action. Should a spill contact a prehistoric archaeological site, damage might include loss of radiocarbon-dating potential, direct impact from oil-spill cleanup equipment, and/or looting resulting in the irreversible loss of unique or significant archaeological information. The major effect from an oil-spill impact on coastal historic archaeological sites would be visual contamination, which, while reversible, could result in additional impacts to fragile cultural materials from the cleaning process.

Land Use and Coastal Infrastructure: The CPA proposed action would not require additional coastal infrastructure, with the exception of possibly one new gas processing facility and one new pipeline landfall. As a result, there may be increased demand for waste disposal services; however, this would minimally affect land use and infrastructure because waste disposal would occur at facilities already designated for such purposes and enough spare capacity exists at these facilities in the GOM region (Dismukes, official communication, 2015). The existing oil and gas infrastructure is expected to be sufficient to handle development associated with the CPA proposed action. There may be some expansion at current facilities, but the land in the analysis area is sufficient to handle such development. There is also sufficient land to construct a new gas processing plant in the analysis area, should it be needed. Accidental events, such as oil or chemical spills and vessel collisions, would have no effects on land use. Coastal or nearshore spills, as well as vessel collisions, could have short-term adverse effects on coastal infrastructure, requiring cleanup of any oil or chemicals spilled.

Demographics: The CPA proposed action is projected to minimally affect the demography of the analysis area. Population impacts from the CPA proposed action are projected to be minimal (<1% of total population) for any economic impact area in the Gulf of Mexico region. The baseline population patterns and distributions, as projected and described in **Chapter 4.1.1.23.2** are expected to remain unchanged as a result of the CPA proposed action. Accidental events associated with the CPA proposed action, such as oil or chemical spills and vessel collisions, would likely have no effects on the demographic characteristics of the Gulf coastal communities.

Economic Factors: The CPA proposed action would not cause employment effects >1 percent in any Economic Impact Area along the Gulf Coast. Most of the employment related to the CPA proposed action is expected to occur in the coastal areas of Louisiana and Texas. The demand would be met primarily with the existing population and labor force.

Environmental Justice: Environmental justice implications arise indirectly from onshore activities conducted in support of OCS oil and gas exploration, development, and production. Because the onshore infrastructure support system for the OCS oil- and gas-related industry (and its associated labor force) is highly developed, widespread, and has operated for decades within a heterogeneous Gulf of Mexico population, impacts of routine activities resulting from the CPA proposed action are not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people. Accidental disturbances resulting from the CPA proposed action, including oil spills, vessel collision, and chemical/drilling fluids spills, have the potential to negatively affect minority and low-income populations through direct exposure to oil, dispersants, degreasers, and other chemicals that can affect human health; decreased access to natural resources due to environmental damages, fisheries closures, or

wildlife contamination; and proximity to onshore disposal sites used in support of oil and chemical spill cleanup efforts. The CPA proposed action would help to maintain ongoing levels of activity, which may or may not result in the expansion of existing infrastructure. For a detailed discussion of scenario projections and the potential for expansion at existing facilities and/or construction of new facilities, refer to **Chapter 3.1.2**.

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ABBREVIATIONS AND ACRONYMS

°C	degree Celsius
°F	degree Fahrenheit
µg	microgram
2012-2017 WPA/CPA Multisale EIS	*Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; Central Planning Area Lease Sales 227, 231, 235, 241, and 247; Final Environmental Impact Statement; Volumes I-III*
2D	two-dimensional
3D	three-dimensional
ac	acre
ACP	Area Contingency Plan
Agreement	Agreement between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico
AL	Alabama
API	American Petroleum Institute
Area ID	Area Identification
ASLM	Assistant Secretary of the Interior for Land and Minerals
B.P.	before present
bbl	barrel
BBO	billion barrels of oil
BOEM	Bureau of Ocean Energy Management
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BOP	blowout preventer
BP	British Petroleum
BSEE	Bureau of Safety and Environmental Enforcement
BTEX	benzene, ethylbenzene, toluene, and xylene
Call	Call for Information
CD	Consistency Determination
CEQ	Council on Environmental Quality
CEWAF	chemically enhanced (dispersed) water-accommodated fraction
CFR	Code of Federal Regulations
CG	Coast Guard (also: USCG)
CH_4	methane
CIAP	Coastal Impact Assistance Program
cm	centimeter
CMP	Coastal Management Program
CO	carbon monoxide
CO_2	carbon dioxide
COE	Corps of Engineers (U.S. Army)
CPA	Central Planning Area
CPA 235/241/247 Supplemental EIS	*Gulf of Mexico OCS Oil and Gas Lease Sales: 2015-2017; Central Planning Area Lease Sales 235, 241, and 247; Final Supplemental Environmental Impact Statement*
CPA 241/247 and EPA 226 Supplemental EIS	*Gulf of Mexico OCS Oil and Gas Lease Sales: 2016 and 2017; Central Planning Area Lease Sales 241 and 247; Eastern Planning Area Lease Sale 226; Final Supplemental Environmental Impact Statement*
CSA	Continental Shelf Associates
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DIVER	Data Integration, Visualization, and Reporting

DOC	Department of Commerce (U.S.) (also: USDOC)
DOCD	development operations coordination document
DOD	Department of Defense (U.S.) (also: USDOD)
DOE	Department of Energy (U.S.) (also: USDOE)
DOI	Department of the Interior (U.S.) (also: USDOI)
DP	dynamically positioned
DPS	Distinct Population Segment
e.g.	for example
EA	environmental assessment
EFH	essential fish habitat
EIA	Economic Impact Area
EIS	environmental impact statement
EP	exploration plan
EPA	Eastern Planning Area
EPA 225/226 EIS	*Gulf of Mexico OCS Oil and Gas Lease Sales: 2014 and 2016; Eastern Planning Area Lease Sales 225 and 226; Final Environmental Impact Statement*
ERMA	Environmental Response Management Application
ESA	Endangered Species Act of 1973
ESI	Environmental Sensitivity Index
et al.	and others
et seq.	and the following
EWTA	Eglin Water Test Area
Final PDARP/PEIS	*Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement*
Five-Year Program	*Proposed Final Outer Continental Shelf Oil & Gas Leasing Program: 2012-2017*
Five-Year Program EIS	*Outer Continental Shelf Oil and Gas Leasing Program: 2012-2017, Final Programmatic Environmental Impact Statement*
FL	Florida
FPSO	floating production, storage, and offloading system
FR	*Federal Register*
ft	feet
FWS	Fish and Wildlife Service
FY	fiscal year
g	gram
G&G	geological and geophysical
GHG	greenhouse gas
GMFMC	Gulf of Mexico Fishery Management Council
GOM	Gulf of Mexico
GPS	global positioning system
GUIS	Gulf Islands National Seashore
H_2S	hydrogen sulfide
ha	hectare
HWCG	Helix Well Containment Group
i.e.	that is
in	inch
ITL	Information to Lessees and Operators
IUCN	International Union for the Conservation of Nature
kg	kilogram
km	kilometer
km^2	square kilometers
L	liter
LA	Louisiana
lb	pound
LC_{50}	lethal concentration, 50% mortality

LCA	Louisiana Coastal Area
LNG	liquefied natural gas
LOOP	Louisiana Offshore Oil Port
LUMCON	Louisiana Universities Marine Consortium
m	meter
m/sec	meters/second
MAFLA	Mississippi, Alabama, and Florida
MARAD	Maritime Administration (U.S. Department of Transportation)
Mcf	thousand cubic feet
mi	mile
mi^2	square miles
mm	millimeter
MMbbl	million barrels
MMPA	Marine Mammal Protection Act of 1972
MMS	Minerals Management Service
MOA	Memorandum of Agreement
MODU	mobile offshore drilling unit
MS	Mississippi
MWCC	Marine Well Containment Company
N.	north
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NGL	natural gas liquid
NMFS	National Marine Fisheries Service
nmi	nautical-mile
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent to Prepare an EIS
NOS	Notice of Sale
NO_x	nitrogen oxides
NPDES	National Pollutant and Discharge Elimination System
NPS	National Park Service
NRC	National Research Council
NRDA	Natural Resource Damage Assessment
NTL	Notice to Lessees and Operators
O_3	ozone
OBC	ocean bottom cables
OCS	Outer Continental Shelf
OCD	Offshore and Coastal Dispersion
OCSLA	Outer Continental Shelf Lands Act
ODMDS	ocean dredged-material disposal site
OSAT	Operational Science Advisory Team
OSHA	Occupational Safety and Health Administration
OSRA	Oil Spill Risk Analysis
OSRP	oil-spill response plans
OSRR	Oil Spill Response Research
OSV	offshore supply/service vessels
P.L.	Public Law
PAH	polycyclic aromatic hydrocarbons
PBR	potential biological removal
PM_{10}	particulate matter less than or equal to 10 μm
$PM_{2.5}$	particulate matter less than or equal to 2.5 μm

ppb	parts per billion
ppm	parts per million
PSBF	potentially sensitive biological feature
PSD	Prevention of Significant Deterioration
RESTORE Act	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012
ROD	Record of Decision
ROV	remotely operated vehicle
RRT	Regional Response Team
S.	south
SAV	submerged aquatic vegetation
SBF	synthetic-based fluid
SBM	synthetic-based mud
SCAT	Shoreline Cleanup and Assessment Team
SE	standard error
sec	second
Secretary	Secretary of the Interior
SIL	Significant Impact Level
SMART	Special Monitoring of Applied Response Technologies
SO_2	sulphur dioxide
SO_x	sulphur oxides
sp.	species
spp.	multiple species
Stat.	Statute
STOF-THPO	Seminole Tribe of Florida-Tribal Historic Preservation Officer
TA&R	Technology Assessment and Research Program
Tcf	trillion cubic feet
TCW	treatment, completion, and workover
TPH	total petroleum hydrocarbon
Trustee Council	Natural Resource Damage Assessment Trustee Council
TX	Texas
U.S.	United States
U.S.C.	United States Code
UME	unusual mortality event
USCG	U.S. Coast Guard (also: CG)
USDHS	U.S. Department of Homeland Security
USDOC	U.S. Department of Commerce (also: DOC)
USDOE	U.S. Department of Energy (also: DOE)
USDOI	U.S. Department of the Interior (also: DOI)
USDOT	U.S. Department of Transportation (also: DOT)
USEPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey (also: GS)
VGP	Vessel General Permit
VOC	volatile organic compound
VSP	vertical seismic profiling
W.	west
WAF	water-accommodated fractions
WPA	Western Planning Area
WPA 233/CPA 231 Supplemental EIS	*Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231, Final Supplemental Environmental Impact Statement*
WPA 238/246/248 Supplemental EIS	*Gulf of Mexico OCS Oil and Gas Lease Sales: 2014-2016; Western Planning Area Lease Sales 238, 246, and 248; Final Environmental Impact Statement*

WPA 246/248 Supplemental EIS	*Gulf of Mexico OCS Oil and Gas Lease Sales: 2015 and 2016; Western Planning Area Lease Sales 246 and 248; Final Environmental Impact Statement*
WSF	water soluble fraction
yd	yard
yr	year

CONVERSION CHART

To convert from	To	Multiply by
centimeter (cm)	inch (in)	0.3937
millimeter (mm)	inch (in)	0.03937
meter (m)	foot (ft)	3.281
meter^2 (m^2)	foot^2 (ft^2)	10.76
meter^2 (m^2)	yard^2 (yd^2)	1.196
meter^2 (m^2)	acre (ac)	0.0002471
meter^3 (m^3)	foot^3 (ft^3)	35.31
meter^3 (m^3)	yard^3 (yd^3)	1.308
kilometer (km)	mile (mi)	0.6214
kilometer^2 (km^2)	mile^2 (mi^2)	0.3861
hectare (ha)	acre (ac)	2.47
liter (L)	gallons (gal)	0.2642
degree Celsius (°C)	degree Fahrenheit (°F)	°F = (1.8 x °C) + 32
1 barrel (bbl) = 42 gal = 158.9 L = approximately 0.1428 metric tons 1 nautical mile (nmi) = 1.15 mi (1.85 km) or 6,076 ft (1,852 m) tonnes = 1 long ton or 2,240 pounds		

CHAPTER 1

THE PROPOSED ACTION

1. THE PROPOSED ACTION

1.1. PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The proposed Federal action addressed in this Supplemental Environmental Impact Statement (EIS) is to offer for lease certain Outer Continental Shelf (OCS) blocks located in the Central Planning Area (CPA) of the Gulf of Mexico (GOM) (**Figure 1-1**). Under the *Proposed Final Outer Continental Shelf Oil & Gas Leasing Program: 2012-2017* (Five-Year Program) (USDOI, BOEM, 2012a), proposed CPA Lease Sale 247 is tentatively scheduled to be held in March 2017. The purpose of the proposed Federal action is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the Outer Continental Shelf Lands Act (OCSLA) of 1953 (67 Stat. 462), as amended (43 U.S.C. §§ 1331 *et seq.*). The proposed CPA lease sale will provide qualified bidders the opportunity to bid upon and lease acreage in the Gulf of Mexico OCS in order to explore, develop, and produce oil and natural gas. Under the OCSLA, for each potential lease sale in the Five-Year Program, the Bureau of Ocean Energy Management (BOEM) makes individual decisions on whether and how to proceed with a proposed lease sale. This Supplemental EIS will be used by BOEM to make an informed decision on proposed CPA Lease Sale 247.

The need for the proposed action is to further the orderly development of OCS resources (43 U.S.C. § 1331(3)). The Gulf of Mexico constitutes one of the world's major oil- and gas-producing areas and has historically provided a steady and reliable source of crude oil and natural gas for more than 50 years. Oil serves as the feedstock for liquid hydrocarbon products, including gasoline, aviation and diesel fuel, and various petrochemicals. Oil from the CPA would help reduce the Nation's dependence on foreign oil imports. The U.S. consumed 19.03 million barrels (MMbbl) of oil per day (USDOE, Energy Information Administration, 2015a) and 25.26 trillion cubic feet (Tcf) of natural gas per day (USDOE, Energy Information Administration, 2014a) in 2014. In 2014, Gulf of Mexico OCS leases provided 16 percent of all crude oil production (USDOE, Energy Information Administration, 2015b) and 3.9 percent of all natural gas produced in the U.S. (USDOE, Energy Information Administration, 2015c). The Energy Information Administration projects the total U.S. consumption of liquid fuels, including fossil fuels and biofuels, to fall slightly from 19.06 MMbbl per day in 2014 to 18.73 MMbbl by 2040 (USDOE, Energy Information Administration, 2014b). The Energy Information Administration also projects the total U.S. consumption of natural gas to rise from 25.26 Tcf in 2014 to 31.48 Tcf by 2040 (USDOE, Energy Information Administration, 2014a). The U.S. net imports of natural gas accounted for 1.36 Tcf in 2014 and are projected to decrease to 0.04 Tcf by 2017 (USDOE, Energy Information Administration, 2014a). A recent report shows total U.S. natural gas production increasing between the 1990's and 2011, due in part to shale gas resources (USDOE, National Energy Technology Laboratory, 2013). This same report predicts continued increased natural gas production to 2040 (USDOE, National Energy Technology Laboratory, 2013). Altogether, net imports of crude oil and petroleum products (imports minus exports) accounted for 28.7 percent of our total petroleum consumption in 2014 and are projected to increase to 32.2 percent by 2040 (USDOE, Energy Information Administration, 2014c). The U.S. crude oil and petroleum products imports stood at 9.2 MMbbl per day in 2014 (USDOE, Energy Information Administration, 2015d). Exports totaled 2.9 MMbbl per day in 2014, mainly in the form of distillate fuel oil, petroleum coke, and residual fuel oil (USDOE, Energy Information Administration, 2014d). The net exports of natural gas are projected to be 0.66 Tcf in 2018 and rise to 5.78 Tcf in 2040 (USDOE, Energy Information Administration, 2014a). In 2014, the Nation's biggest supplier of crude oil and petroleum-product imports was Canada (37%), with countries in the Persian Gulf being the second largest source (20%) (USDOE, Energy Information Administration, 2015d). In 2014, the Nation's biggest supplier of natural gas imports was Canada (98%), with Trinidad being the second largest source (1.6%) (USDOE, Energy Information Administration, 2015e). Oil produced from the CPA would also reduce the environmental risks associated with transoceanic oil tankering from sources overseas. In addition, natural gas is not easily transported, making domestic production especially desirable. The need for domestic natural gas reserves is also based upon the use of gas as an environmentally preferable alternative to oil for generating electricity.

The Secretary of the Interior (Secretary) has designated BOEM as the administrative agency responsible for the mineral leasing of submerged OCS lands and for the supervision of most offshore operations after lease issuance. BOEM is responsible for managing development of the Nation's offshore

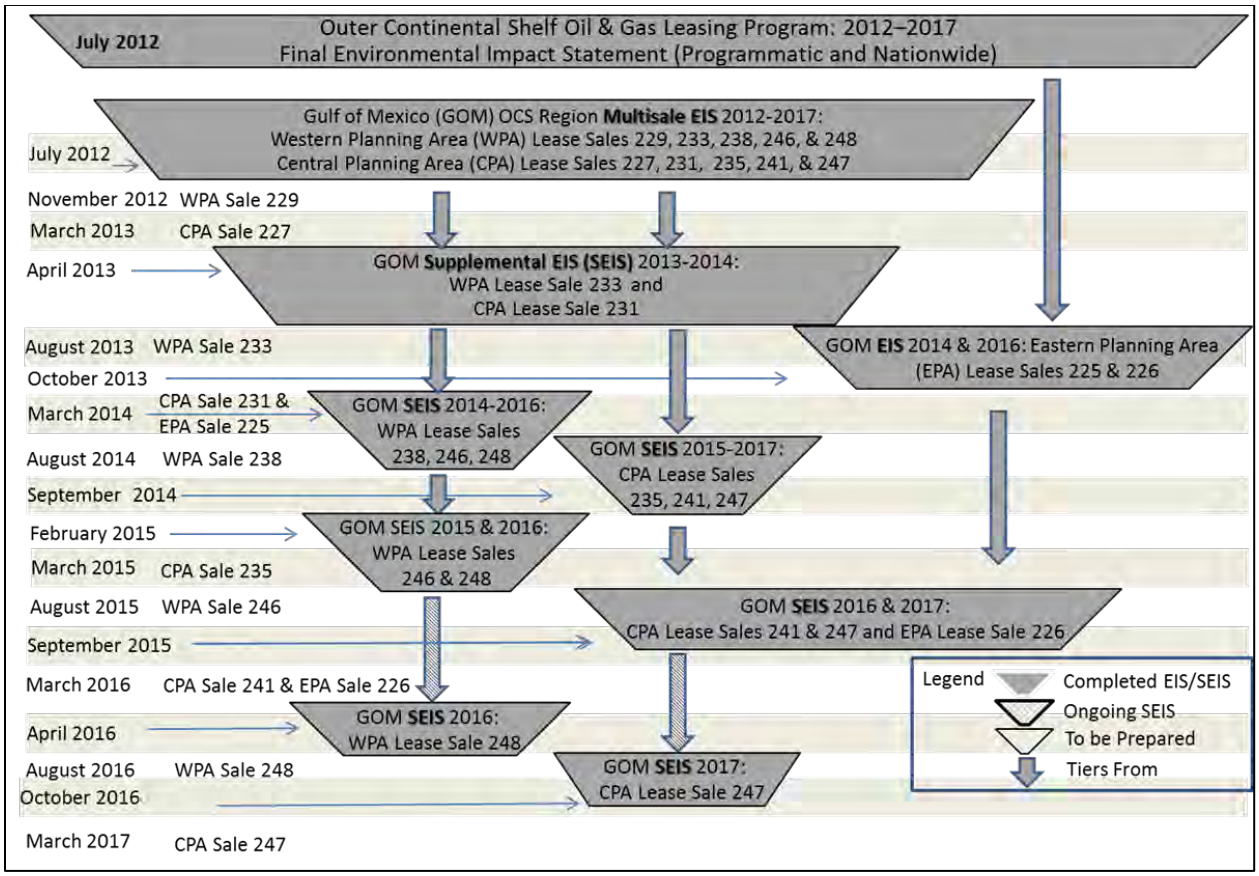
resources in an environmentally and economically responsible way. The functions of BOEM on the OCS include leasing; the regulation of exploration, development, and production activities; plan administration; environmental studies; NEPA analysis; hydrocarbon resource evaluation; economic analysis; and the renewable energy program. In addition, the Secretary has designated the Bureau of Safety and Environmental Enforcement (BSEE) as being responsible for enforcing safety and environmental regulations. The functions of BSEE include all field operations, including permitting and research, inspections, offshore regulatory programs, oil-spill response, and training and environmental compliance functions.

Other Pertinent Environmental Reviews or Documentation

This Supplemental EIS supplements, tiers from, and incorporates by reference all of the relevant analyses from the Multisale EIS and Supplemental EISs listed below, i.e., the "prior 2012-2017 Gulf of Mexico EISs."

- July 2012 – *Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; Central Planning Area Lease Sales 227, 231, 235, 241, and 247, Final Environmental Impact Statement* (2012-2017 WPA/CPA Multisale EIS) (USDOI, BOEM, 2012b)
- April 2013 – *Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231, Final Supplemental Environmental Impact Statement* (WPA 233/CPA 231 Supplemental EIS) (USDOI, BOEM, 2013a)
- September 2014 – *Gulf of Mexico OCS Oil and Gas Lease Sales: 2015-2017; Central Planning Area Lease Sales 235, 241, and 247, Final Supplemental Environmental Impact Statement* (CPA 235/241/247 Supplemental EIS) (USDOI, BOEM, 2014a)
- September 2015 – *Gulf of Mexico OCS Oil and Gas Lease Sales: 2016 and 2017; Central Planning Area Lease Sales 241 and 247; Eastern Planning Area Lease Sale 226, Final Supplemental Environmental Impact Statement* (CPA 241/247 and EPA 226 Supplemental EIS) (USDOI, BOEM, 2015a)

The NEPA documents listed above are part of the Five-Year Program, and their relationship (tiering and supplementing) and timing with their respective proposed actions (lease sales) are illustrated in the figure below.



Each subsequent Supplemental EIS, regardless of the planning area, updates the analysis of the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the GOM in **Chapter 4.1**, and updates the cumulative impacts from the most recent Supplemental EIS. Within each specific planning area, the baseline conditions for that planning area are updated to reflect the most recent technical and scientific information available.

This Supplemental EIS focuses on updating the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs.

This Supplemental EIS analyzes the potential impacts of the proposed action in the CPA on the marine, coastal, and human environments. This Supplemental EIS will also assist decisionmakers in making informed, future decisions regarding the approval of operations, as well as leasing. At the completion of the NEPA process, a decision will be made for proposed CPA Lease Sale 247. The analysis in this Supplemental EIS also focuses on the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the areas identified through the Area Identification (Area ID) procedure as the proposed lease sale area. In addition to the No Action alternative (i.e., cancel the proposed lease sale), other alternatives are considered for the proposed CPA lease sale, such as deferring certain areas from the proposed lease sale.

1.2. Description of the Proposed Action

The proposed action is the last oil and gas lease sale in the CPA, as scheduled in the Five-Year Program. Proposed CPA Lease Sale 247 is tentatively scheduled to be held in March 2017. The analyses contained within this Supplemental EIS examine impacts from a single, typical CPA lease sale.

The proposed CPA lease sale area encompasses about 63 million acres (ac) of the total CPA area of 66.45 million ac. This area begins 3 nautical miles (nmi) (3.5 miles [mi]; 5.6 kilometers [km]) offshore Louisiana, Mississippi, and Alabama, and extends seaward to the limits of the United States' jurisdiction

over the continental shelf (often referred to as the Exclusive Economic Zone) in water depths up to approximately 3,346 meters (m) (10,978 feet [ft]) (**Figure 1-1**). As of August 2016, approximately 47.39 million ac of the proposed CPA lease sale area are unleased. This information is updated monthly and can be found on BOEM's website at http://www.boem.gov/Gulf-of-Mexico-Region-Lease-Map/.

The estimated amount of resources projected to be developed as a result of a single, typical CPA lease sale (i.e., proposed CPA Lease Sale 247) is 0.460-0.894 billion barrels of oil (BBO) and 1.939-3.903 trillion cubic feet (Tcf) of gas. The proposed CPA lease sale includes proposed lease stipulations designed to reduce environmental risks; these stipulations are discussed in **Chapter 2.3.1.3** of this Supplemental EIS and in Chapter 2.4.1.3 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS and Chapter 2.3.1.3 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS.

1.3. Regulatory Framework

Federal laws mandate the OCS leasing program (e.g., OCSLA) and the environmental review process (e.g., NEPA). Several Federal regulations establish specific consultation and coordination processes with Federal, State, and local agencies (e.g., Coastal Zone Management Act, Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Marine Mammal Protection Act). In addition, the OCS leasing process and all activities and operations on the OCS must comply with other applicable Federal, State, and local laws and regulations. A detailed list of the major, applicable Federal laws, regulations, and Executive Orders are listed below. Information about select, applicable Federal laws, regulations, and Executive Orders can be found in *OCS Regulatory Framework for the Gulf of Mexico Region* (Cameron and Matthews, 2016).

Regulation, Law, and Executive Order	Citation
Outer Continental Shelf Lands Act	43 U.S.C. §§ 1331 *et seq.*
National Environmental Policy Act of 1969	42 U.S.C. §§ 4321-4347 40 CFR §§ 1500-1508
Coastal Zone Management Act of 1972	16 U.S.C. §§ 1451 *et seq.* 15 CFR part 930
Endangered Species Act of 1973	16 U.S.C. §§ 1531 *et seq.*
Magnuson-Stevens Fishery Conservation and Management Act	16 U.S.C. §§ 1801 *et seq.*
Essential Fish Habitat Consultation (in 1996 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act)	P.L. 94-265 16 U.S.C. §§ 1801-1891 50 CFR part 600 subpart K
Marine Mammal Protection Act	16 U.S.C. §§ 1361 *et seq.*
Clean Air Act	42 U.S.C. §§ 7401 *et seq.* 40 CFR part 55
Clean Water Act	33 U.S.C. §§ 1251 *et seq.*
Harmful Algal Bloom and Hypoxia Research and Control Act	P.L. 108-456
Oil Pollution Act of 1990	33 U.S.C. §§ 2701 *et seq.* Executive Order 12777
Comprehensive Environmental Response, Compensation, and Liability Act of 1980	42 U.S.C. §§ 9601 *et seq.*
Resource Conservation and Recovery Act	42 U.S.C. §§ 6901 *et seq.*
Marine Plastic Pollution Research and Control Act	33 U.S.C. §§ 1901 *et seq.*
National Fishing Enhancement Act of 1984	33 U.S.C. §§ 2101 *et seq.*
Fishermen's Contingency Fund	43 U.S.C. §§ 1841-1846
Ports and Waterways Safety Act of 1972	33 U.S.C. §§ 1221 *et seq.*
Marine and Estuarine Protection Acts	33 U.S.C. §§ 1401 *et seq.*
Marine Protection, Research, and Sanctuaries Act of 1972	P.L. 92-532

Regulation, Law, and Executive Order	Citation
National Estuarine Research Reserves	16 U.S.C. § 1461, Section 315
National Estuary Program	P.L. 100-4
Coastal Barrier Resources Act	16 U.S.C. §§ 3501 *et seq*.
National Historic Preservation Act	54 U.S.C. §§ 300101 *et seq*.
Rivers and Harbors Act of 1899	33 U.S.C. §§ 403 *et seq*.
Occupational Safety and Health Act of 1970	29 U.S.C. §§ 651-678
Energy Policy Act of 2005	P.L. 109-58
Gulf of Mexico Energy Security Act of 2006	P.L. 109-432
Marine Debris Research, Prevention, and Reduction Act	P.L. 109-449
American Indian Religious Freedom Act of 1978	P.L. 95-341 42 U.S.C. §§ 1996 and 1996a
Migratory Bird Treaty Act of 1918	16 U.S.C. §§ 703-712
Submerged Lands Act of 1953	43 U.S.C. §§ 1301 *et seq*.
Structures Interfering with Air Commerce	49 U.S.C. § 44718
Marking of Obstructions	14 U.S.C. § 86
Wilderness Act of 1964	P.L. 88-577 16 U.S.C. §§ 1131-1136 78 Stat. 890
Toxic Substances Control Act	P.L. 94-469 15 U.S.C. §§ 2601-2697 Stat. 2003
Bald and Golden Eagle Protection Act of 1940	P.L. 86-70 16 U.S.C. §§ 668-668d
Executive Order 11988: Floodplain Management	42 FR 26951 (1977); amended by Executive Order 12148 (7/20/79)
Executive Order 11990: Protection of Wetlands	42 FR 26961 (1977); amended by Executive Order 12608 (9/9/87)
Executive Order 12114: Environmental Effects Abroad	44 FR 1957 (1979)
Executive Order 12898: Environmental Justice	59 FR 5517 (1994)
Executive Order 13007: Indian Sacred Sites	61 FR 26771-26772 (1996)
Executive Order 13089: Coral Reef Protection	63 FR 32701-32703 (1998)
Executive Order 13175: Consultation and Coordination with Indian Tribal Governments	65 FR 67249-67252 (2000)
Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds	66 FR 3853 (2001)

1.3.1. Recent BOEM/BSEE Rule Changes

In light of the 2010 *Deepwater Horizon* explosion, oil spill, and response, the Federal Government, along with industry, increased their rules and safety measures related to oil-spill prevention, containment, and response. Additionally, the Federal Government and industry have increased their research and reform in response to the *Deepwater Horizon* explosion, oil spill, and response through government-funded research, industry-funded research, and joint partnerships. These joint partnerships are often between government agencies, industry, and nongovernmental organizations. For more information about the recent BOEM/BSEE rule changes prior to this Supplemental EIS, refer to Chapters 1.3 and 1.5 of the prior 2012-2017 Gulf of Mexico EISs.

1.3.1.1. Recent and Ongoing Regulatory Reform and Government-Sponsored Research

BOEM and BSEE have instituted regulatory reforms responsive to many of the recommendations expressed in the various reports prepared following the *Deepwater Horizon* explosion, oil spill, and response. To date, regulatory reform has occurred through both prescriptive and performance-based regulation and guidance, as well as OCS safety and environmental protection requirements, as described in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, and EPA 225/226 EIS. The reforms strengthen the requirements for all aspects of OCS operations. Ongoing reform and research endeavors to improve workplace safety and to strengthen oil-spill prevention planning, containment, and response are described in detail in Chapter 1.3.1.2 of the 2012-2017 WPA/CPA Multisale EIS and Chapter 1.3.2.3 of the EPA 225/226 EIS, with updated information in Chapter 1.3.2.2 of the WPA 233/CPA 231 Supplemental EIS and Chapter 1.3.1.1 of the CPA 235/241/247 Supplemental EIS. Since publication of the CPA 235/241/247 Supplemental EIS, BSEE published the updated final Drilling Safety Rule (*Federal Register*, 2016a). The 2016 Final Rule is a comprehensive regulation that addresses all dimensions of well control, including more stringent design requirements and operational procedures for critical well-control equipment used in oil and gas operations on the United States' OCS. More on the 2016 Final Rule can be found in **Chapter 3.2.2**.

New and modified Notices to Lessees and Operators (NTLs) and other policies applicable to OCS oil and gas operations in the Gulf of Mexico, which were published after the publication of the CPA 241/247 and EPA 226 Supplemental EIS and pertain to environmental issues, are summarized below. A detailed listing of the current Gulf of Mexico OCS Region NTLs is available through BOEM's Gulf of Mexico OCS Region's website at http://boem.gov/Regulations/Notices-Letters-and-Information-to-Lessees-and-Operators.aspx or through the Region's Public Information Office at 504-736-2519 or 1-800-200-GULF. In addition, a detailed listing of BSEE's current Gulf of Mexico OCS Region NTLs is available through BSEE's website at http://www.bsee.gov/Regulations-and-Guidance/Notices-to-Lessees/index/ or through the Region's Public Information Office at 1-800-200-GULF.

NTL 2015-BSEE-G01, "Time Between Drilling Operations"

This NTL was issued pursuant to BSEE's regulations under 30 CFR § 250.103 and 30 CFR § 250.180(e). It provides guidance and clarification in response to recent questions from the offshore oil and gas industry regarding the granting of more than 180 days between drilling operations on leases continued beyond their primary terms.

NTL 2015-BSEE-G02, "Hurricane and Tropical Storm Effects Reports"

This NTL supercedes NTL 2011-G01. It provides guidance on using either email or the eWell Permitting and Reporting System to report hurricane and tropical storm effects information, specifies the information included in the various hurricane and tropical storm reports, and makes minor administrative amendments.

NTL 2015-BOEM-N04, "General Financial Assurance"

This NTL supersedes NTL 2000-G16, dated September 7, 2000. It provides updates to bureau names and citations that changed as a result of the reorganization of the former Minerals Management Service (MMS) and broadens the scope of the superseded NTL to a National NTL that covers all of BOEM's general bond (financial assurance) requirements. This NTL clarifies BOEM's implementation of the requirements for general financial assurance applicable to oil and gas and sulphur leases, pipeline rights-of-way, and right-of-use and easement grants and a specific type of permit used by BOEM.

NTL 2015-BOEM-N06, "Procedures and Requirements for Right-of-Use and Easement Requests for Platforms, Artificial Islands, Installations and other Devices Attached to the Seabed"

This NTL provides guidance and clarifies the policy related to the requirements for right-of-use and easement requests to construct and maintain platforms, artificial islands, installations, and other devices permanently or temporarily attached to the seabed (collectively referred to as "installations") pursuant to the regulations set forth in 30 CFR part 550 subpart A.

Gulf of Mexico Environmental Studies Program

BOEM's Environmental Studies Program develops, conducts, and oversees world-class scientific research specifically to inform policy decisions regarding development of OCS energy and mineral resources. Research covers physical oceanography, atmospheric sciences, biology, protected species, social sciences and economics, submerged cultural resources, and environmental fates and effects. BOEM is a leading contributor to the growing body of scientific knowledge about the Nation's marine and coastal environment. Studies published by the Environmental Studies Program, Gulf of Mexico OCS Region, since publication of the CPA 241/247 and EPA 226 Supplemental EIS are shown in the table below. For a list of studies published by the Environmental Studies Program, Gulf of Mexico OCS Region, prior to those listed below (i.e., 2006-2013), refer to Appendix E of the CPA 235/241/247 Supplemental EIS and Chapter 1 of the CPA 241/247 and EPA 226 Supplemental EIS. A listing of the currently active studies addressing this broad range of topics can be found at http://www.boem.gov/GMStudies/.

Publications of the Environmental Studies Program, Gulf of Mexico OCS Region,
Since Publication of the CPA 241/247 and EPA 226 Supplemental EIS

Study Number	Title
BOEM 2015-003	*Assessing Impacts of OCS Activities on Public Infrastructure, Services, and Population in Coastal Communities Following Hurricanes Katrina and Rita*
BOEM 2015-006	*Observations and Dynamics of the Loop Current*
BOEM 2015-026	*Baseline Bioacoustic Characterization for Offshore Renewable Energy Development in the North Carolina and Georgia Wind Planning Areas*
BOEM 2015-027 BOEM 2015-028	*Long-Term Monitoring at East and West Flower Garden Banks National Marine Sanctuary, 2011-2012* *Volume 1: Technical Report* *Volume 2: Appendixes*
BOEM 2015-051	*Biomass and Mass-balance Isotope Content of Seep Populations on the Upper Slope Gulf of Mexico, Determined from Archived Samples*
BOEM 2015-035	*Data Assimilative Hindcast for the Gulf of Mexico*
BOEM 2016-019	*Pressure Wave and Acoustic Properties Generated by the Explosive Removal of Offshore Structures in the Gulf of Mexico*
BOEM 2016-020	*An Analysis of the Impacts of the* Deepwater Horizon *Oil Spill on the Gulf Seafood Industry*
BOEM 2016-021 BOEM 2016-022	*Exploration and Research of the Northern Gulf of Mexico Deepwater natural and Artificial Hard-Bottom Habitats with Emphasis on Coral Communities: Reefs, Rigs, and Wrecks—"Lophelia II"* *Volume I: Technical Report* *Volume II: Appendices*

1.3.1.2. Recent and Ongoing Industry Reform and Research

Since publication of the WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS, the oil and gas industry and engineering trade groups have continued to prepare new standards and develop best practices for the safe and environmentally responsible development of OCS oil and gas. As an example, the American Petroleum Institute (API) has produced several Recommended Practices and Standards that have become part of State and Federal regulations. In July 2014, API completed Recommended Practice 17W, "Recommended Practice for Subsea Capping Stacks" (API, 2014). This recommended practice covers the design, fabrication, and operation of new subsea capping stacks, and it can be used to improve existing equipment. The API's standards are designed to assist industry professionals improve the efficiency and cost effectiveness of their operations, comply with legislative and regulatory requirements, safeguard health, and protect the environment. The API's Recommended Practices and technical information can be found on API's website (API, 2015a).

1.4. PRELEASE PROCESS

Scoping for this Supplemental EIS was conducted in accordance with the Council on Environmental Quality's (CEQ) guidelines on implementing NEPA (40 CFR § 1501.7). Scoping provides those with an interest in the OCS Program an opportunity to provide comments on the proposed action, alternatives, and mitigating measures to reduce or eliminate impacts. In addition, scoping provides BOEM an opportunity to update the Gulf of Mexico OCS Region's environmental and socioeconomic information base. BOEM conducted early coordination with appropriate Federal and State agencies, federally recognized Indian Tribes, nongovernmental organizations, and other concerned parties to discuss and coordinate the prelease process for proposed CPA Lease Sale 247, for this Supplemental EIS. The scoping process also provided the opportunity for other Federal agencies with similar responsibilities on the OCS to become cooperating agencies. While scoping is an ongoing process, it officially commenced on August 17, 2015, with the publication of the Notice of Intent to Prepare an EIS (NOI) in the *Federal Register* (2015a). Additional public notices were distributed via local newspapers, the U.S. Postal Service, and the Internet. A 30-day comment period was provided; it closed on September 16, 2015. Federal, State, and local governments, and federally recognized Indian Tribes, as well as other interested parties, were invited to send written comments to the Gulf of Mexico OCS Region on the scope of this Supplemental EIS. Comments were received in response to the NOI from Federal and State government agencies, interest groups, industry, businesses, and the general public on the scope of this Supplemental EIS, significant issues that should be addressed, alternatives that should be considered, and mitigating measures. All scoping comments received were considered in the preparation of the Draft Supplemental EIS. The comments are summarized in **Chapter 5.3** ("Development of the Draft Supplemental EIS").

In addition to BOEM's consideration of scoping comments received for this Supplemental EIS, this document tiers from and incorporates by reference all of the relevant scoping comments and responses to the comments from the prior 2012-2017 Gulf of Mexico EISs. A summary of scoping comments incorporated by reference can be found in Chapter 5.3 ("Development of the Draft Supplemental EIS") of the prior 2012-2017 Gulf of Mexico EISs.

At the beginning of each Five-Year Program, the Gulf of Mexico OCS Region releases an Area ID for each planning area, defining the proposed lease sale areas. On June 20, 2011, BOEM released its Area ID decision for the CPA and WPA lease sale areas. The Area ID is an administrative prelease step that describes the geographical area of the proposed action (proposed lease sale area) and identifies the alternatives, mitigating measures, and issues to be analyzed in the appropriate NEPA document. As mandated by NEPA, this Supplemental EIS analyzes the potential impacts of the CPA proposed action on the marine, coastal, and human environments.

On February 26, 2016, BOEM released the Draft Supplemental EIS for review and comment. BOEM mailed copies of the Draft Supplemental EIS for review and comment to Federal, State, and local government agencies; federally recognized Indian Tribes; industry; nongovernmental organizations; the general public; and local libraries. To initiate the public review and comment period on the Draft Supplemental EIS, BOEM published a Notice of Availability (NOA) in the *Federal Register* on February 26, 2016 (*Federal Register*, 2016b). The public comment period ended on April 11, 2016. In

addition, public notices were mailed with the Draft Supplemental EIS and were placed on BOEM's website at http://www.boem.gov/nepaprocess/.

A consistency review will be performed in accordance with the Coastal Zone Management Act (CZMA), and a Consistency Determination (CD) will be prepared for each CZMA State prior to the proposed CPA lease sale. To prepare the CDs, BOEM reviews each CZMA State's Coastal Management Program (CMP) and analyzes the potential impacts as outlined in this Supplemental EIS, new information, and applicable studies as they pertain to the enforceable policies of each CMP. Based on the analyses, BOEM's Gulf of Mexico OCS Region's Regional Director makes an assessment of consistency, which is then sent to the CZMA States of Louisiana, Mississippi, Alabama, and Florida for the proposed CPA lease sale. If a CZMA State disagrees with the Bureau of Ocean Energy Management's CDs, the State is required to do the following under the CZMA: (1) indicate how BOEM's presale proposal is inconsistent with the CZMA State's CMP; (2) describe the specific enforceable policies (including citations) that are inconsistent; and (3) suggest alternative measures to bring BOEM's proposal into consistency with the CZMA State's CMP and/or describe the need for additional information that would allow a determination of consistency. Unlike the consistency process for specific OCS plans and permits, there is not a procedure for administrative appeal to the Secretary of Commerce for a Federal CD for prelease activities. In the event of a disagreement between a Federal agency and the CZMA State's CMP regarding consistency of the proposed lease sales, either BOEM or the CZMA State may request mediation. The regulations provide for an opportunity to resolve any differences with the CZMA State, but the CZMA allows BOEM to proceed with a proposed lease sale despite any unresolved disagreements if the Federal agency clearly describes in writing how the activity is consistent to the maximum extent practicable with the CZMA State's CMP.

Proposed CPA Lease Sale 247 is tentatively scheduled for March 2017. BOEM must publish the Final Supplemental EIS at least 30 days prior to a decision on whether and/or how to proceed with proposed CPA Lease Sale 247. BOEM published an NOA for the Final Supplemental EIS in the *Federal Register*, sent copies of the Final Supplemental EIS to Federal, State, and local agencies; federally recognized Indian Tribes; industry; nongovernmental organizations; the general public; and local libraries. In addition, public notices were mailed with the Final Supplemental EIS and placed on BOEM's website at http://www.boem.gov/nepaprocess/. At the completion of this Supplemental EIS process, a decision will be made for proposed CPA Lease Sale 247.

The Final Supplemental EIS is not a decision document. The Assistant Secretary of the Interior for Land and Minerals Management (ASLM) will make a decision on whether to hold the proposed lease sale and, if the decision is made to hold the lease sale, then any particulars relevant to the lease sale including, but not limited to, the lease sale area and any mitigations will be announced in a Final Notice of Sale (NOS). A NEPA Record of Decision (ROD) will memorialize the decision and will identify BOEM's preferred alternative for the lease sale, as well as the environmentally preferable alternative, if different. The ROD will summarize the proposed action and the alternatives evaluated in this Supplemental EIS, the information considered in reaching the decision, and the adopted mitigations. An NOA for the ROD will be published in the *Federal Register* and will be made available on BOEM's website at http://www.boem.gov/nepaprocess.

A Proposed NOS will become available to the public 4-5 months prior to the proposed lease sale. A notice announcing the availability of the Proposed NOS appears in the *Federal Register*, initiating a 60-day comment period. Comments received will be analyzed during preparation of the decision documents that are the basis for the Final NOS, including lease sale configuration and terms and conditions.

If the ASLM decides to hold the proposed lease sale, a Final NOS will be published in its entirety in the *Federal Register* at least 30 days prior to the lease sale date, as required by the OCSLA.

Measures to Enhance Transparency and Effectiveness in the Leasing and Tiering Process

The following discussion is from the *Outer Continental Shelf Oil and Gas Leasing Program: 2012-2017, Final Environmental Impact Statement* (Five-Year Program EIS; USDOI, BOEM, 2012a) and has been incorporated into this Supplemental EIS for information purposes.

BOEM realizes that each region is different in terms of mineral resources and dependent economies, the relative state of infrastructure and support industries, and the sensitivity of ecosystems, environmental resources, and communities; and that a leasing strategy needs to be sensitive to those differences, but also

that it must be consistent with OCSLA principles. BOEM envisions a phased OCSLA process that minimizes multiple-use and environmental conflicts to the extent possible during the Five-Year Program implementation, that makes lease sale decisions in the context of the best available information, and that discloses clear reasons for those decisions, even in the face of uncertainty. This vision is consistent with the National Ocean Policy Implementation Plan and related Marine Planning initiatives, all of which provide a complementary framework for space-use conflict considerations.

BOEM is committing to several process enhancements to ensure transparency during the phased OCSLA and tiered NEPA processes of this Five-Year Program. Although specific approaches to implementation may be tailored to the different needs of the Regions and their stakeholders, BOEM is determined to improve the effectiveness of the tiering process (40 CFR § 1508.28) through the following:

- **Alternative and Mitigation Tracking Table.** BOEM has established an alternative and mitigation tracking table to provide increased visibility into the consideration of recommendations for deferrals, mitigations, and alternatives at different stages of the leasing process. Beginning with the Five-Year Program EIS, the table tracks the lineage and treatment of suggestions for spatial exclusions, temporal deferrals, and/or mitigation from the Five-Year Program to the lease sale phase and on to the plan phase. This table allows commenters to see how and at what stage of the process their concerns are being considered. BOEM will maintain a table that will be updated as deferral requests are considered at the lease sale and plan stages and as new requests are made. The alternative and mitigation tracking table has been placed on BOEM's website at http://www.boem.gov/5-year/2012-2017/Tracking-Table/.

- **Strengthening the Prelease Sale Process.** BOEM is taking a number of steps to enhance opportunities for members of the public to comment and provide new information in the prelease sale planning process. Historically, the Call for Information (Call), which is the first step in the Prelease Sale Process, has generally asked for industry to nominate specific blocks or descriptions of areas within the Five-Year Program area for which they have the most interest. The NOI requests comments from other Federal, State, and local governments, nongovernmental organizations, and the general public on issues that should be addressed and alternatives that should be considered in the NEPA documents that will be prepared for the action.

- **Annual Progress Report.** BOEM will publish an annual progress report on the approved Five-Year Program that includes an opportunity for stakeholders and the public to comment on the Five-Year Program's implementation. Under Section 18(e) of the OCSLA, the Secretary must review annually the approved Five-Year Program. Historically, this has been an internal review process that reported to the Secretary any information or events that might result in a revision to the Five-Year Program. If the revision is considered significant under the OCSLA, the Five-Year Program can only be revised and reapproved by following the same Section 18 steps used to originally develop the Program. However, once the Section 18 process has been initiated for the next Five-Year Program, the annual review is subsumed in that process, as the same substantive and procedural requirements are being addressed.

  The findings of the annual progress report may lead the Secretary to revise the Five-Year Program by reducing the size of, delaying, or canceling scheduled lease sales. If the desired revisions are considered significant, such as including new areas for consideration or more lease sales in areas already included, the entire Section 18 process must be followed, in essence resulting in the preparation of a new Program.

  BOEM's 2014 Annual Progress Report (issued in January 2015) provided an overview of the activities that occurred during the previous year. Oil and gas exploration, development, and production were successful in the Gulf of Mexico, and there was no indication of proposed revisions to the current 2012-2017 Five-Year Program for the remainder of the Program. Nonetheless, BOEM is currently engaged in the development of the 2017-2022 Five-Year Program and should there be any

proposed revisions, they would be subsumed into the ongoing 2017-2022 Section 18 process.

- **Systematic Planning.** BOEM is committed to engaging in systematic planning opportunities that foster improved governmental coordination, communication, and information exchange. As the only agency authorized to grant renewable energy, marine mineral, and oil and gas leases on the OCS, the Bureau of Ocean Energy Management has been assigned the Federal co-lead, along with the U.S. Coast Guard (USCG), for systematic regional planning efforts in the Mid-Atlantic. Additionally, BOEM will participate on Regional Planning Bodies in the Northeast, Mid-Atlantic, and West Coast as the DOI lead. In the Gulf of Mexico OCS Region, BOEM representatives will assist the U.S. Fish and Wildlife Service (FWS), the DOI regional lead, with various working group activities. This will facilitate data and information availability, provide research of new technologies, and identify conflict resolution and avoidance strategies. BOEM anticipates that its Marine Planning engagement will enhance regulatory efficiency through improved coordination and collaboration, and, in the long term, enhance the stewardship of ocean and coastal resources.

These strategies will allow BOEM to not only address the activities that take place under the 2012-2017 Five-Year Program but also to lay the groundwork for decisions that will be faced in subsequent Five-Year Programs. BOEM will improve efforts to gather information while enhancing opportunities for stakeholders and other interested parties to participate in and be engaged in the decisionmaking process. The initiation of studies and long-term planning will facilitate future decisions by ensuring that the best information is available when making leasing decisions on the approved program and before the development of future OCS Programs.

1.5. POSTLEASE ACTIVITIES

BOEM and BSEE are responsible for managing, regulating, and monitoring oil and natural gas exploration, development, and production operations on the Federal OCS to promote the orderly development of mineral resources and to prevent harm or damage to, or waste of, any natural resource, any life or property, or the marine, coastal, or human environment. Regulations for oil, gas, and sulphur lease operations are specified in 30 CFR parts 250, 550, 551 (except those aspects that pertain to drilling), and 554.

Measures to minimize potential impacts are an integral part of the OCS Program. These measures are implemented through lease stipulations, operating regulations, and project-specific requirements or approval conditions. The NTLs provide clarifications and additional information on some of these measures. Mitigating measures address concerns such as endangered and threatened species, geologic and manmade hazards, military warning and ordnance disposal areas, archaeological sites, air quality, oil-spill response planning, chemosynthetic communities, artificial reefs, operations in hydrogen sulfide (H_2S)-prone areas, and shunting of drill effluents in the vicinity of biologically sensitive features. BOEM issues NTLs to provide clarification, description, or interpretation of a regulation; to provide guidelines on the implementation of a special lease stipulation or regional requirement; or to convey administrative information. A detailed listing of the current Gulf of Mexico OCS Region's NTLs is available through BOEM's website at http://www.boem.gov/Notices-to-Lessees-and-Operators/ or through the Region's Public Information Office at 504-736-2519 or 1-800-200-GULF. Refer to Appendix A of the CPA 241/247 and EPA 226 Supplemental EIS ("Commonly Applied Mitigating Measures") for more information on the mitigations that BOEM and BSEE apply to permits.

Formal plans (i.e., exploration plans, development and production plans, and development operations coordination documents) and applications must be submitted to BOEM for review and approval before any project-specific activities can begin on a lease. Conditions of approval, which are mechanisms to control or mitigate potential safety or environmental problems associated with proposed operations, must be met before the activities can be approved by BOEM or BSEE. Conditions of approval are based on BOEM's technical and environmental evaluations of the proposed operations. Comments from Federal

and State agencies (as applicable) are also considered in establishing conditions. Conditions may be applied to any OCS plan, permit, right-of-use and easement, or pipeline right-of-way grant.

Some BOEM-identified mitigating measures are implemented through cooperative agreements or coordination with the oil and gas industry and Federal and State agencies. These measures include the National Marine Fisheries Service's (NMFS) Observer Program to protect marine mammals and sea turtles when OCS structures are removed using explosives, labeling of operational supplies to track sources of accidental debris loss, development of methods of pipeline landfall to eliminate impacts to barrier beaches, and semiannual beach cleanup events.

Refer to Chapter 1.5 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS for descriptions of postlease activities, including the following: geological and geophysical (G&G) surveys; exploration and development plans; permits and applications; inspection and enforcement; pollution prevention, oil-spill response plans, and financial responsibility; air emissions; flaring and venting; hydrogen sulfide contingency plans; archaeological resources regulation; coastal zone management consistency review and appeals for plans; best available and safest technologies, including at production facilities; personnel training and education; structure removal and site clearance; marine protected species NTLs; and the Rigs-to-Reefs program.

1.6. Other OCS Oil- and Gas-Related Activities

BOEM and BSEE have programs and activities that are OCS oil- and gas-related but not specific to the oil and gas leasing process or to the management of exploration, development, and production activities. These programs include environmental and technical studies, cooperative agreements with other Federal and State agencies for NEPA work, joint jurisdiction over cooperative efforts, inspection activities, OCS sand borrowing, and regulatory enforcement. BOEM also participates in industry research efforts and forums. Chapter 1.6 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS contains descriptions of the other OCS oil- and gas-related activities, including the Environmental Studies Program, Technology Assessment Program (formerly known as Technology Assessment & Research [TA&R] Program), the Oil Spill Response Research (OSRR) Program, and interagency agreements.

For more than 25 years, BSEE (and it predecessors) have aggressively maintained a comprehensive, long-term research program (i.e., the OSRR Program) that is dedicated to improving oil-spill response options. The major focus of the program is to improve the methods and technologies used for oil-spill detection, containment, treatment, recovery, and cleanup. The OSRR Program is a cooperative effort bringing together funding and expertise from research partners in government agencies, industry and the international community. The BSEE's recently completed research projects (by project number) that are related to oil-spill response include the following:

- **Project 1043:** Scientifically Based Field Tools for Predicting Dispersant Effectiveness and Usage Rates;
- **Project 1048:** Developing a Capabilities-Based Framework for Designing and Evaluating Oil Spill Response Exercises;
- **Project 1058:** Remote Sensing Systems to Detect and Analyze Oil Spills on the US Outer Continental Shelf – A State of the Art Assessment;
- **Project 1064:** ASTM F2709-08 Testing of Skimmer Systems;
- **Project 1010:** Comparison of Physical and Chemical Characteristics of *In-Situ* Burn Residue and Other Environmental Oil Samples Collected during the *Deepwater Horizon* Spill Response; and
- **Project 1050:** Geo-Referencing Identification (GRID) Tag.

A full list of BSEE's project reports is available at http://www.bsee.gov/Technology-and-Research/Oil-Spill-Response-Research/Categories/Decision-Making-Support-Tools/.

CHAPTER 2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This Supplemental EIS addresses one proposed Federal action: proposed oil and gas Lease Sale 247 in the CPA of the Gulf of Mexico OCS (**Figure 1-1**), as scheduled in the Five-Year Program (USDOI, BOEM, 2012a). The proposed action (proposed lease sale) assumes compliance with applicable regulations and lease stipulations in place at the time a ROD is signed for the proposed action.

2.1. SUPPLEMENTAL EIS NEPA ANALYSIS

Proposed CPA Lease Sale 247 was analyzed in the 2012-2017 WPA/CPA Multisale EIS. This Supplemental EIS tiers from the prior 2012-2017 Gulf of Mexico EISs (i.e., 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS), and it summarizes and hereby incorporates those documents by reference. Proposed CPA Lease Sale 247 is expected to be within the scenario ranges summarized in **Chapter 3** of this Supplemental EIS and as discussed in Chapter 3 of those NEPA documents from which it tiers.

At the completion of the NEPA process for this Supplemental EIS, a decision will be made on whether or how to hold proposed CPA Lease Sale 247. Informal and formal consultation with other Federal agencies, the affected States, federally recognized Indian Tribes, nongovernmental organizations, and the public will be carried out to integrate to the fullest extent possible environmental impact analyses with other environmental review laws and Executive Orders.

2.2. ALTERNATIVES, MITIGATING MEASURES, AND ISSUES

2.2.1. Alternatives

The alternatives to be considered for proposed CPA Lease Sale 247 are detailed in **Chapter 2.3**. These suggested alternatives have been derived from both the historical comments submitted to BOEM and the EIS-specific scoping performed for this analysis.

Through our scoping efforts for this Supplemental EIS and the prior 2012-2017 Gulf of Mexico EISs, numerous issues and topics were identified for consideration. During the scoping period for the prior 2012-2017 Gulf of Mexico EISs, a number of alternatives or deferral options were suggested and examined for inclusion in Chapter 2.2.1 of each of those NEPA documents. Those alternative and deferral options were also reexamined during the preparation of this Supplemental EIS. These suggestions included additional deferrals, policy changes, and suggestions beyond the scope of this Supplemental EIS. BOEM has not identified any new significant information that changes its conclusions in the prior 2012-2017 Gulf of Mexico EISs or that indicates that the proposed alternatives or deferral options are appropriate for further in-depth analysis. The justifications for not carrying those suggestions through detailed analyses in this Supplemental EIS are the same as those used in the prior 2012-2017 Gulf of Mexico EISs.

The analyses of environmental impacts from the proposed alternatives summarized in **Chapter 2.3.1.2** below and described in detail in **Chapter 4.1.1** are based on the development scenario, which is a set of assumptions and estimates on the amounts, locations, and timing for OCS oil and gas exploration, development, and production operations and facilities, both offshore and onshore. A detailed discussion of the development scenario and major related impact-producing factors is included in **Chapter 3**.

2.2.1.1. Alternatives for Proposed Central Planning Area Lease Sale 247

Alternative A—The Proposed Action (Preferred Alternative): This alternative would offer for lease all unleased blocks within the proposed CPA lease sale area for oil and gas operations (**Figure 2-1**), with the following exceptions:

(1) whole and portions of blocks deferred by the Gulf of Mexico Energy Security Act of 2006; and

(2) blocks that are adjacent to or beyond the United States' Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap.

The U.S. Department of the Interior (DOI or USDOI) is conservative throughout the NEPA process and includes the total area within the CPA for environmental review even though the leasing of portions of the CPA (subareas or blocks) can be deferred during a Five-Year Program.

The proposed CPA lease sale area encompasses about 63 million ac of the total CPA area of 66.45 million ac. As of August 2016, approximately 47.39 million ac of the proposed CPA lease sale area are unleased. This information is updated monthly and can be found on BOEM's website at http://www.boem.gov/Gulf-of-Mexico-Region-Lease-Map/. The estimated amount of resources projected to be developed as a result of the proposed CPA lease sale is 0.460-0.894 BBO and 1.939-3.903 Tcf of gas (**Table 3-1**).

Alternative B—Exclude the Unleased Blocks Near Biologically Sensitive Topographic Features: This alternative would offer for lease all unleased blocks within the proposed CPA lease sale area, as described for the proposed action (Alternative A), but it would also exclude from leasing any unleased blocks subject to the Topographic Features Stipulation. The estimated amount of resources projected to be developed is 0.460-0.894 BBO and 1.939-3.903 Tcf of gas (refer to **Chapter 2.3.2** for further details).

Alternative C—No Action: This alternative is the cancellation of the proposed CPA lease sale. If this alternative is chosen, the opportunity for development of the estimated 0.460-0.894 BBO and 1.939-3.903 Tcf of gas that could have resulted from the proposed CPA lease sale would be postponed during the current 2012-2017 Five-Year Program, but it could again be contemplated as part of a future Five-Year Program. Any potential environmental impacts arising out of the proposed CPA lease sale would not occur, but activities associated with existing leases in the CPA would continue. This alternative is also analyzed in the EIS for the Five-Year Program on a nationwide programmatic level.

Alternatives and Deferrals Considered but Not Analyzed in Detail

Chapter 2.2.1.2 of the 2012-2017 WPA/CPA Multisale EIS includes a detailed description of alternatives previously considered but not analyzed in detail in this Supplemental EIS, including the following: exclude deep water and limit leasing to shallow waters; delay leasing until drilling safety is improved; do not allow drilling in areas with strong ocean currents such as the Loop Current; delay leasing until the state of the Gulf of Mexico environmental baseline is known; and identify and protect sensitive ecosystems. The justifications for not engaging in detailed analysis of these alternatives and deferrals in this Supplemental EIS are the same as those used in the prior 2012-2017 Gulf of Mexico EISs, and BOEM has identified no new information that changes these conclusions. During scoping for this Supplemental EIS and the CPA 241/247 and EPA 226 Supplemental EIS, the National Park Service (NPS) requested that BOEM develop an alternative that excludes unleased blocks within 15 mi (24 km) of the Gulf Island National Seashore (GUIS). This alternative was previously addressed in Chapter 2.2.1.1 of the CPA 241/247 and EPA 226 Supplemental EIS, which is incorporated by reference.

2.2.2. Mitigating Measures

The NEPA process is intended to help public officials make decisions that are based on an understanding of environmental consequences and to take actions that protect, restore, and enhance the environment. Agencies are required to identify and include in an EIS those appropriate mitigating measures not already included in the proposed action or alternatives. The CEQ regulations (40 CFR § 1508.20) define mitigation as follows:

- Avoidance—Avoiding an impact altogether by not taking a certain action or part of an action.
- Minimization—Minimizing impacts by limiting the intensity or magnitude of the action and its implementation.
- Restoration—Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

- Maintenance—Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensation—Compensating for the impact by replacing or providing substitute resources or environments.

2.2.2.1. Proposed Mitigating Measures Analyzed

The potential lease stipulations and mitigating measures included for analysis in this Supplemental EIS were developed as a result of numerous scoping efforts for the continuing OCS Program in the Gulf of Mexico. Ten lease stipulations (described in Chapter 2.4.1.3 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS and Chapter 2.3.1.3 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS) are proposed for CPA Lease Sale 247—the Topographic Features Stipulation; Live Bottom (Pinnacle Trend) Stipulation; Military Areas Stipulation; Evacuation Stipulation; Coordination Stipulation; Blocks South of Baldwin County, Alabama, Stipulation; Protected Species Stipulation; United Nations Convention on the Law of the Sea Royalty Payment Stipulation; Below Seabed Operations Stipulation; and the Stipulation on the Agreement between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico. The United Nations Convention on the Law of the Sea Royalty Payment Stipulation is applicable to the proposed CPA lease sale even though it is not an environmental or military stipulation.

These measures will be considered for adoption by the ASLM, under authority delegated by the Secretary of the Interior. The analysis of any stipulations for Alternative A does not ensure that the ASLM will make a decision to apply the stipulations to leases that may result from the proposed CPA lease sale nor does it preclude minor modifications in wording during subsequent steps in the prelease process if comments indicate changes are necessary or if conditions change.

Any lease stipulations or mitigating measures to be included in a lease sale will be described in the ROD for that lease sale. Mitigating measures in the form of lease stipulations are added to the lease terms and are therefore enforceable as part of the lease. In addition, each exploration and development plan, as well as any pipeline applications that result from a lease sale, will undergo a NEPA review, and additional project-specific mitigations will be applied as conditions of plan approval. Refer to Appendix A ("Commonly Applied Mitigating Measures") of the CPA 241/247 and EPA 226 Supplemental EIS for more information on the mitigations that BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) typically apply to plans and/or permits. The BSEE has the authority to monitor and enforce these conditions and, under 30 CFR part 250 subpart N, may seek remedies and penalties from any operator that fails to comply with those conditions, stipulations, and mitigating measures.

2.2.2.2. Existing Mitigating Measures

Mitigating measures have been proposed, identified, evaluated, or developed through previous BOEM lease sale NEPA review and analysis. Many of these mitigating measures have been adopted and incorporated into regulations and/or guidelines governing OCS oil and gas exploration, development, and production activities. All plans for OCS oil- and gas-related activities (e.g., exploration and development plans, pipeline applications, and structure-removal applications) go through rigorous BOEM review and approval to ensure compliance with established laws and regulations. Existing mitigating measures must be incorporated and documented in plans submitted to BOEM. Operational compliance of the mitigating measures is enforced through BSEE's onsite inspection program.

Mitigating measures are a standard part of BOEM's program to ensure that operations are conducted in an environmentally sound manner (with an emphasis on minimizing any adverse impact of routine operations on the environment). For example, certain measures ensure site clearance, and survey procedures are carried out to determine potential snags to commercial fishing gear and to avoid archaeological sites and biologically sensitive areas such as pinnacles, topographic features, and chemosynthetic and nonchemosynthetic deepwater benthic communities. In addition, all BOEM-regulated activities and operations must comply with the requirements of other agencies having jurisdiction. Refer to **Chapter 5** for more information on applicable consultation and coordination requirements.

Some BOEM-identified mitigating measures are incorporated into OCS operations through cooperative agreements or efforts with industry and State and Federal agencies. These mitigating measures include mandating compliance with NMFS's Observer Program to protect marine mammals and sea turtles during the use of explosives for structure removal and G&G activities, labeling operational supplies to track possible sources of debris or equipment loss, developing methods of pipeline landfall to eliminate impacts to beaches or wetlands, and requiring beach cleanup events.

Site-specific mitigating measures are also applied by BOEM during plan and permit reviews. BOEM realized that many of these site-specific mitigations were recurring and developed a list of "standard" mitigations. There are currently over 120 standard mitigations. The wording of a standard mitigation is developed by BOEM in advance and may be applied whenever conditions warrant. Standard mitigation text is revised as often as is necessary (e.g., to reflect changes in regulatory citations, agency/personnel contact numbers, and internal policy). Site-specific mitigation "categories" include air quality, archaeological resources, artificial reef material, chemosynthetic communities, Flower Garden Banks, topographic features, hard bottom/pinnacles/potentially sensitive biological features, military warning areas and Eglin water test areas, hydrogen sulfide, drilling hazards, remotely operated vehicle surveys, geophysical survey reviews, and general safety concerns. Site-specific mitigation "types" include advisories, conditions of approval, hazard survey reviews, inspection requirements, notifications, post-approval submittals, and safety precautions. In addition to standard mitigations, BOEM may apply nonrecurring mitigating measures that are developed on a case-by-case basis. Refer to Appendix A ("Commonly Applied Mitigating Measures") of the CPA 241/247 and EPA 226 Supplemental EIS for more information on the mitigations that BOEM and BSEE typically apply to plans and/or permits.

BOEM is continually revising applicable mitigations to allow the Gulf of Mexico OCS Region to more easily and routinely track mitigation compliance and effectiveness. A primary focus of this effort is requiring post-approval submittal of information within a specified timeframe or after a triggering event (e.g., end of operations reports for plans, construction reports for pipelines, and removal reports for structure removals).

2.2.3. Issues

Issues are defined in CEQ Guidance as the principal "effects" that an EIS should evaluate in-depth. Selection of environmental and socioeconomic issues to be analyzed was based on the following criteria:

- the issue is identified in CEQ regulations as subject to evaluation;
- the relevant resource/activity was identified through agency expertise, through the scoping process, or from comments on past EISs;
- the resource/activity may be vulnerable to one or more of the impact-producing factors associated with the OCS Program;
- a reasonable probability of an interaction between the resource/activity and impact-producing factor should exist; or
- the information that indicates a need to evaluate the potential impacts to a resource/activity has become available.

2.2.3.1. Issues to be Analyzed

Chapter 2.2.3.1 of the 2012-2017 WPA/CPA Multisale EIS addresses the issues related to potential impact-producing factors and the environmental and socioeconomic resources and activities that could be affected by OCS oil and gas exploration, development, production, and transportation activities (i.e., accidental events; drilling fluids and cuttings; visual and aesthetic interference; air emissions; water quality degradation and other wastes; structure and pipeline emplacement; platform removals; OCS oil- and gas-related support services, activities, and infrastructure; and regional cultures and socioeconomics). **Chapter 4.1** of this Supplemental EIS, Chapter 4.2.1 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS describe the resources and activities that could be affected by the impact-producing factors listed above and include the following resource topics:

- Air Quality
- Archaeological Resources (Historic and Prehistoric)
- Beach Mice
- Coastal Barrier Beaches and Associated Dunes
- Coastal and Marine Birds
- Commercial Fisheries
- Deepwater Benthic Communities (Chemosynthetic and Nonchemosynthetic)
- Diamondback Terrapins
- Fish Resources and Essential Fish Habitat
- Gulf Sturgeon
- Human Resources and Land Use (Land Use and Coastal Infrastructure, Demographics, Economic Factors, and Environmental Justice)
- Live Bottoms (Pinnacle Trend and Low Relief)
- Marine Mammals
- Recreational Fishing
- Recreational Resources
- *Sargassum* Communities
- Sea Turtles
- Seagrass Communities
- Soft Bottom Benthic Communities
- Species Considered due to U.S. Fish and Wildlife Service Concerns
- Topographic Features
- Water Quality (Coastal and Offshore)
- Wetlands

2.2.3.2. Issues Considered but Not Analyzed

As previously noted, the CEQ regulations for implementing NEPA instruct agencies to adopt an early process (termed "scoping") for determining the scope of issues to be addressed and for identifying significant issues related to a proposed action. As part of this scoping process, agencies shall identify and eliminate from detailed study the issues that are not significant to the proposed action or that have been covered by prior environmental review.

Additional issues were identified during scoping. Many of those issues were addressed in previous environmental reviews and, as a result, will not be addressed in this Supplemental EIS. These issues are summarized below.

The NPS provided a recommendation to consider an alternative that excludes unleased blocks within 15 mi (24 km) of the GUIS, as well as a series of recommendations related to impact assessment that should be conducted related to the GUIS and GUIS-related resources. Since the NPS's comments that were submitted for this Supplemental EIS are similar to those submitted for the CPA 241/247 and EPA 226 Supplemental EIS and since those issues were previously addressed in Chapter 5.12 of the CPA 241/247 and EPA 226 Supplemental EIS, they have not been carried forward for additional analysis in this Supplemental EIS.

Comments were received from the Louisiana Department of Natural Resources recommending that BOEM provide for compensatory mitigating measures for secondary, indirect, and cumulative impacts to Louisiana's coast. Refer to Chapter 5.12 of the CPA 241/247 and EPA 226 Supplemental EIS for BOEM's responses related to these mitigation recommendations. Since it was addressed in the CPA 241/247 and EPA 226 Supplemental EIS, this issue will not be carried forward for additional analysis in this Supplemental EIS.

Additionally, BOEM considers the full range of mitigating measures during site- or activity-specific reviews. BOEM is also evaluating the possible types of compensatory mitigation to address recent DOI guidance related to landscape-scale mitigation policy and the Presidential memorandum dated November 3, 2015, which requires DOI bureaus to explore compensatory mitigation when appropriate.

Additional comments were received during scoping that highlighted the potential impacts to water quality and fisheries resources from oil and gas support-vessel discharges and produced waters and drilling wastes. A discussion of these impact-producing factors can be found in Chapters 3.1.1.4.10 (vessel operational wastes), 3.1.1.4.1 (drilling muds and cuttings), and 3.1.1.4.2 (produced waters) of the 2012-2017 WPA/CPA Multisale EIS. A discussion of these potential impacts can be found in Chapters 4.2.1.2, 4.2.1.18, 4.2.1.19, and 4.2.1.20 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS and Chapters 4.1.1.2, 4.1.1.18, 4.1.1.19, and 4.1.1.20 of the CPA 235/241/247 Supplemental and CPA 241/247 and EPA 226 Supplemental EIS.

Concerns about human health impacts associated with the *Deepwater Horizon* explosion, oil spill, and response were also raised during scoping. As discussed in Chapter 4.2.1.23.4.3 of the 2012-2017

WPA/CPA Multisale EIS, the *Deepwater Horizon* explosion, oil spill, and response was an accidental event of catastrophic proportion. An analysis of a low-probability catastrophic oil spill and the potential human health impacts that may be associated with that type of oil spill and its associated response activities can be found in Appendix B of the CPA 241/EPA 226 Supplemental EIS.

One commenter raised concerns about the allocation of offshore oil and gas revenues to coastal states. Information about Public Law 109-432, which describes revenue sharing between the Federal Government and Gulf of Mexico oil- and gas-producing states (i.e., Alabama, Louisiana, Mississippi, and Texas) can be found in Chapter 1.3 of the 2012-2017 WPA/CPA Multisale EIS and in *OCS Regulatory Framework for the Gulf of Mexico Region* (Matthews and Cameron, 2010).

Another commenter raised a series of concerns about pipelines that bring products onshore. The commenter discussed historic and the potential for future vessel/pipelines collisions and associated pipeline spills, and requested that these concerns be brought forward for scoping and environmental review. Chapter 4.2.1.23.1.1 of the 2012-2017 WPA/CPA Multisale EIS provides detailed information about coastal pipelines, pipeline landfalls, and pipeline shore facilities, including the steady decline in new pipeline projects. Refer to Chapter 4.2.1.2.1.3 of the 2012-2017 WPA/CPA Multisale EIS for information about coastal water quality impacts from spills resulting from accidental events, including collisions. In addition, the 2012-2017 WPA/CPA Multisale EIS clarifies that pipelines in State waters are not federally managed or maintained (refer to Chapter 5.12 of the 2012-2017 WPA/CPA Multisale EIS).

Another commenter recommended that an oil-spill buoy system that would detect oil in the event of a spill should be in place. There are a number of offshore buoys and other fixed offshore stations that document meteorological conditions in the Gulf of Mexico. These stations are owned and operated by a variety of entities, including Federal and State governments, private industry, academic research institutions, and others. The type, location, and details about the types of historical data collected at these stations can be found on NOAA's National Data Buoy Center website (USDOC, NOAA, 2015a). While these stations do not detect oil spills, they do record wind and current information that could be used to support trajectory modeling in the event of a spill. Trajectory modeling forecasts the movement of oil by employing computer simulations. In some cases, the wind and current information is available in real time and can be used to model oil movement, which in turn, can be used for decisionmaking for cleanup and protection operations. Section 11 of NTL 2012-BSEE-N06, "Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line concerning Regional Oil Spill Response Plans," clarifies the requirements related to spill assessment, including encouraging lessees to consider remote-sensing technology to acquire information to be used for real-time spill trajectory simulations. Additionally, a complete listing of remote-sensing research projects (including an ongoing project for a technology that can monitor for oil spills) is available at http://www.bsee.gov/Technology-and-Research/Oil-Spill-Response-Research/Categories/Remote-Sensing-and-Surveillance/. For leases or facilities located in the Flower Garden Banks Oil Spill Planning Area, Appendix H of NTL 2012-BSEE-N06 further outlines the provisions for obtaining real-time, onsite meteorological information to use in trajectory simulations in the event of spill.

Comments received during scoping are summarized in **Chapter 5.3**.

2.3. Proposed Central Planning Area Lease Sale 247

2.3.1. Alternative A—The Proposed Action

2.3.1.1. Description

Alternative A would offer for lease all unleased blocks within the proposed CPA lease sale area for oil and gas operations (**Figure 2-1**), with the following exceptions:

(1) whole and portions of blocks deferred by the Gulf of Mexico Energy Security Act of 2006; and

(2) blocks that are adjacent to or beyond the United States Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap.

The DOI is conservative throughout the NEPA process and includes the total area within the CPA for environmental review even though the leasing of portions of the CPA (subareas or blocks) can be deferred during a Five-Year Program.

The proposed CPA lease sale area encompasses about 63 million ac of the total CPA area of 66.45 million ac. As of August 2016, approximately 47.39 million ac of the proposed CPA lease sale area are currently unleased. This information is updated monthly and can be found on BOEM's website at http://www.boem.gov/Gulf-of-Mexico-Region-Lease-Map/. The estimated amount of resources projected to be developed as a result of the proposed CPA lease sale is 0.460-0.894 BBO and 1.939-3.903 Tcf of gas (**Table 3-1**).

The analyses of impacts summarized below and described in detail in **Chapter 4.1.1** are based on the development scenario, which is a set of assumptions and estimates on the amounts, locations, and timing for OCS oil and gas exploration, development, and production operations and facilities, both offshore and onshore. A detailed discussion of the development scenario and major related impact-producing factors is included in **Chapter 3**.

Alternative A has been identified as BOEM's preferred alternative; however, this does not mean that another alternative may not be selected in the ROD.

2.3.1.2. Summary of Impacts

A search by BOEM's subject-matter experts was conducted for each resource to consider new information made available since publication of the prior 2012-2017 Gulf of Mexico EISs and to consider new information on the *Deepwater Horizon* explosion, oil spill, and response. It must also be emphasized that, in arriving at the overall conclusions for certain environmental resources (e.g., coastal and marine birds, fisheries, and wetlands), the conclusions are not based on impacts to individuals, small groups of animals, or small areas of habitat, but on impacts to the resources/populations as a whole. Any new information discovered was analyzed by BOEM's subject-matter experts to determine if the impact conclusions presented in those NEPA documents were altered as a result of the new information.

For the following resources, BOEM's subject-matter experts determined through literature searches and communications with other agencies and academia that there was no new information made available since publication of the prior 2012-2017 Gulf of Mexico EISs that is relevant to potential impacts from the CPA proposed action. Therefore, the impact conclusions for these resources remain the same as those that were presented in the prior 2012-2017 Gulf of Mexico EISs. These impact conclusions are presented in **Chapter 4.1.1** of this Supplemental EIS. For ease of review, the individual chapter number for the resource is provided in the following list.

- Archaeological Resources (Historic and Prehistoric) (**Chapters 4.1.1.22.1 and 4.1.1.22.2**, respectively)

For the following resources, BOEM's subject-matter experts determined through literature searches and communications with other agencies and academia that there was new information made available since publication of the prior 2012-2017 Gulf of Mexico EISs that is relevant to potential impacts from the CPA proposed action. BOEM's subject-matter experts have reexamined the analyses for these resources based on new information made available; however, none of the new information was deemed significant in that it did not alter the impact conclusions presented in those NEPA documents. These impact conclusions are presented in **Chapter 4.1.1**. For ease of review, the individual chapter numbers for each resource are provided in the following list.

- Air Quality (**Chapter 4.1.1.1**)
- Water Quality (Coastal and Offshore) (**Chapters 4.1.1.2.1 and 4.1.1.2.2**, respectively)
- Coastal Barrier Beaches and Associated Dunes (**Chapter 4.1.1.3**)
- Wetlands (**Chapter 4.1.1.4**)
- Seagrass Communities (**Chapter 4.1.1.5**)

- Live Bottoms (**Chapter 4.1.1.6**)
- Topographic Features (**Chapter 4.1.1.7**)
- *Sargassum* Communities (**Chapter 4.1.1.8**)
- Chemosynthetic Deepwater Benthic Communities (**Chapter 4.1.1.9**)
- Nonchemosynthetic Deepwater Benthic Communities (**Chapter 4.1.1.10**)
- Soft Bottom Benthic Communities (**Chapter 4.1.1.11**)
- Marine Mammals (**Chapter 4.1.1.12**)
- Sea Turtles (**Chapter 4.1.1.13**)
- Diamondback Terrapins (**Chapter 4.1.1.14**)
- Beach Mice (**Chapter 4.1.1.15**)
- Coastal and Marine Birds (**Chapter 4.1.1.16**)
- Gulf Sturgeon (**Chapter 4.1.1.17**)
- Fish Resources and Essential Fish Habitat (**Chapter 4.1.1.18**)
- Commercial Fisheries (**Chapter 4.1.1.19**)
- Recreational Fishing (**Chapter 4.1.1.20**)
- Recreational Resources (**Chapter 4.1.1.21**)
- Human Resources and Land Use (Land Use and Coastal Infrastructure, Demographics, Economic Factors, and Environmental Justice) (**Chapters 4.1.1.23.1, 4.1.1.23.2, 4.1.1.23.3, and 4.1.1.23.4**, respectively)
- Species Considered due to U.S. Fish and Wildlife Service Concerns (**Chapter 4.1.1.24**)

Ultimately, no new significant information was discovered that would alter the impact conclusions for any of the resources analyzed in the prior 2012-2017 Gulf of Mexico EISs. The analyses and potential impacts detailed in those NEPA documents remain valid and, as such, apply for proposed CPA Lease Sale 247.

In accordance with CEQ guidelines to provide decisionmakers with a robust environmental analysis, **Appendix B** ("Catastrophic Spill Event Analysis") provides an analysis of the potential impacts of a low-probability catastrophic oil spill, which is not part of the CPA proposed action and not likely expected to occur, to the environmental and cultural resources and the socioeconomic conditions analyzed in **Chapter 4.1.1**.

2.3.1.3. Mitigating Measures

The following lease stipulations may be applied to the CPA proposed action as mitigating measures. If the decision is to hold a lease sale, the lease stipulations applicable to the sale will be announced in the Final Notice of Sale and Record of Decision.

2.3.1.3.1. Topographic Features Stipulation

The topographic features located in the CPA provide habitat for hard bottom communities of high biomass and diversity (**Chapter 4.1.1.7**). Without the Topographic Features Stipulation and mitigating measures, these communities could be severely and adversely impacted by OCS oil- and gas-related activities resulting from the CPA proposed action if such activities took place on blocks that are subject to the Topographic Features Stipulation (i.e., those blocks with a topographic feature, a No Activity Zone surrounding a topographic feature, or a shunting zone [1,000-Meter, 1-Mile, 3-Mile, and/or 4-Mile]

surrounding a topographic feature). The DOI has recognized this problem for some years and, since 1973, has made lease stipulations a part of leases on or near these biotic communities so that impacts from nearby oil and gas activities were mitigated. This stipulation would not prevent the recovery of oil and gas resources within a Topographic Features Stipulation block, but it would serve to protect valuable and sensitive biological resources from routine OCS oil- and gas-related activity by distancing bottom-disturbing activity (e.g., anchors, chains, cables, and wire ropes) 152 m (500 ft) from the No Activity Zone that surrounds topographic features and by requiring that drill muds and cuttings be shunted to the seafloor if a well is within a shunting zone (1,000-Meter, 1-Mile, 3-Mile, and/or 4-Mile) surrounding a topographic feature.

The Topographic Features Stipulation was formulated based on consultation with various Federal agencies and comments solicited from the States, industry, environmental organizations, and academic representatives. The Topographic Features Stipulation has been updated over time, using years of scientific information collected since the stipulation was first proposed. This information includes numerous Agency-funded studies of topographic features in the GOM; numerous stipulation-imposed, industry-funded monitoring reports; and numerous studies of drilling discharges offshore (Neff, 2005; Boehm et al., 2001; Neff et al., 2000; and NRC, 1983). BOEM and the National Oceanic and Atmospheric Administration (NOAA) also co-sponsor an ongoing long-term monitoring program at the Flower Garden Banks in order to determine if continued offshore oil- and gas-related activity in the GOM has impacted the reef habitat of these features. This stipulation protects these biotic communities from routine oil and gas activities resulting from the CPA proposed action, while allowing the development of nearby oil and gas resources. This stipulation would not prevent adverse effects of an accident such as a large oil spill from a nearby oil or gas operation from impacting these biotic communities; however, it would distance the activity at least 152 m (500 ft) from the No Activity Zone surrounding topographic features, reducing the possibility of physical oiling. The location of the blocks affected by the Topographic Features Stipulation is shown on **Figure 2-1**. A more detailed discussion and definition of this stipulation and its effectiveness are found in Chapter 2.4.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.2. Live Bottom (Pinnacle Trend) Stipulation

The Live Bottom (Pinnacle Trend) Stipulation covers the pinnacle trend area of the proposed CPA lease sale area. A small portion of the northeastern proposed CPA lease sale area is characterized by a pinnacle trend, which is classified as a live bottom under the stipulation. The pinnacles are a series of topographic irregularities with variable biotal coverage, which provide structural habitat for a variety of pelagic fish. The pinnacles in the region could be impacted from physical damage of unrestricted oil and gas activities, as noted in **Chapter 4.1.1.6**. The Live Bottom (Pinnacle Trend) Stipulation would protect live bottoms (Pinnacle Trend features) from routine OCS oil- and gas-related activity by distancing bottom-disturbing activity (e.g., anchors, chains, cables, and wire ropes) 30 m (100 ft) from hard bottoms/pinnacles. The Live Bottom (Pinnacle Trend) Stipulation is intended to protect the pinnacle trend and the associated hard bottom communities from damage and, at the same time, provide for recovery of potential oil and gas resources. The location of the pinnacle trend areas of the proposed CPA lease sale area is shown on **Figure 2-1**. A more detailed discussion and definition of this stipulation and its effectiveness are found in Chapter 2.4.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.3. Military Areas Stipulation

The Military Areas Stipulation has been applied to all blocks leased in military areas since 1977, and it reduces the potential impacts, particularly in regards to safety. However, this stipulation does not reduce or eliminate the actual physical presence of oil and gas operations in areas where military operations are conducted. The stipulation contains a “hold harmless” clause (holding the U.S. Government harmless in case of an accident involving military operations) and requires lessees to coordinate their activities with appropriate local military contacts. **Figure 2-2** shows the military warning areas in the Gulf of Mexico. A more detailed discussion and definition of this stipulation and its effectiveness are found in Chapter 2.3.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.4. Evacuation Stipulation

The Evacuation Stipulation would be a part of any lease in the easternmost portion of the proposed CPA lease sale area resulting from the CPA proposed action, i.e., Lease Sale 247. This stipulation would provide for evacuation of personnel and shut-in of operations during any events conducted by the military that could pose a danger to ongoing oil and gas operations. It is expected that the invocation of these evacuation requirements will be extremely rare.

It is expected that these measures will serve to eliminate dangerous conflicts between oil and gas operations and military operations. Continued close coordination between BSEE and the military may result in improvements in the wording and implementation of these stipulations.

An evacuation stipulation has been applied to all blocks leased in this area since 2001. A more detailed discussion and definition of this stipulation and its effectiveness are found in Chapter 2.4.1.3.4 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.5. Coordination Stipulation

The Coordination Stipulation would be a part of any lease in the easternmost portion of the proposed CPA lease sale area resulting from the CPA proposed action, i.e., Lease Sale 247. This stipulation would provide for review of pending oil and gas operations by military authorities and could result in delaying oil and gas operations if military activities have been scheduled in the area that may put the oil and gas operations and personnel at risk.

A coordination stipulation has been applied to all blocks leased in this area since 2001. A more detailed discussion and definition of this stipulation and its effectiveness are found in Chapter 2.4.1.3.5 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.6. Blocks South of Baldwin County, Alabama, Stipulation

The Blocks South of Baldwin County, Alabama, Stipulation will be included only on leases on blocks south of and within 15 mi (24 km) of Baldwin County, Alabama. The stipulation specifies requirements for consultation that lessees must follow when developing plans for fixed structures. The stipulation has been continually adopted in annual CPA lease sales since 1999. It has been considered satisfactorily responsive to the concern of the Governor of Alabama and was adopted in each of the CPA lease sales in the 2002-2007 and 2007-2012 Five-Year Programs. A more detailed discussion and definition of this stipulation and its effectiveness are found in Chapter 2.4.1.3.6 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.7. Protected Species Stipulation

The Protected Species Stipulation has been applied to all blocks leased in the GOM since December 2001. This stipulation was developed in consultation with the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NMFS, and the U.S. Department of the Interior, FWS, in accordance with Section 7 of the Endangered Species Act, and it is designed to minimize or avoid potential adverse impacts to federally protected species. A more detailed discussion and definition of this stipulation and its effectiveness are found in Chapter 2.3.1.3.3 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.8. United Nations Convention on the Law of the Sea Royalty Payment Stipulation

If the U.S becomes a party to the 1982 United Nations Convention on the Law of the Sea prior to or during the life of a lease issued by the U.S on a block or portion of a block located beyond its Exclusive Economic Zone as defined in the United Nations Convention on the Law of the Sea and subject to such conditions that the Senate may impose through its constitutional role of advice and consent, then the royalty payment lease provisions will apply to the lease so issued, consistent with Article 82 of the United Nations Convention Law of the Sea. A more detailed discussion and definition of this stipulation can be found in Chapter 2.3.1.3.4 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.9. Below Seabed Operations Stipulation

The Below Seabed Operations Stipulation language is intended to be lease sale-specific language and would incorporate maps of the blocks that may be affected. This stipulation can be found in Chapter 2.4.1.3.9 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.10. Stipulation on the Agreement between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico

The "Agreement Between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico" has now entered into force, making it possible for U.S. lessees to enter into voluntary agreements with a licensee of the United Mexican States to develop transboundary reservoirs. The stipulation has been applied to blocks or portions of blocks located wholly or partially within the 3 statute miles (4.8 km) of the maritime or continental shelf boundary with Mexico. The stipulation incorporates by reference the Agreement and notifies lessees that, among other things, activities in this boundary area will be subject to the Agreement and that approval of plans, permits, and unitization agreements will be conditioned upon compliance with the terms of the Agreement. For more information, refer to the Agreement itself, which is available on BOEM's website at http://www.boem.gov/BOEM-Newsroom/Library/Publications/Agreement-between-the-United-States-and-Mexico-Concerning-Transboundary-Hydrocarbon-Reservoirs-in-the-Gulf-of-Mexico.aspx.

2.3.2. Alternative B—Exclude the Unleased Blocks Subject to the Topographic Features Stipulation

2.3.2.1. Description

Alternative B differs from Alternative A by not offering the blocks that are subject to the proposed Topographic Features Stipulation but would be offered under Alternative A (Chapter 2.4.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS and **Figure 2-1** of this Supplemental EIS). These unleased blocks will not be available for lease under Alternative B. A total of 207 blocks within the CPA are affected by the Topographic Features Stipulation. Maps indicating the areas affected by the Topographic Features Stipulation, which is routinely applied to leases in the vicinity of certain geographic features, can be found at http://www.boem.gov/Topographic-Features-Stipulation-Map-Package/.

The number of unleased blocks that would not be offered under Alternative B represents only a small percentage of the total number of blocks to be offered under Alternative A; therefore, it is assumed that the levels of activity for Alternative B would be essentially the same as those projected for the CPA proposed action (refer to **Chapter 4.1.2**). The estimated amount of resources projected to be developed under Alternative B is within the same scenario range as for Alternative A, i.e., 0.460-0.894 BBO and 1.939-3.903 Tcf of gas. All other assumptions, including the 9 other potential stipulations as described in **Chapter 2.2.2.1.3**, and estimates are the same as for Alternative A. A description of Alternative A is presented in **Chapter 2.3.1.1**. The Topographic Features Stipulation would not be applicable with Alternative B because the blocks that could be subject to the Topographic Features Stipulation would not be offered for lease.

2.3.2.2. Summary of Impacts

The analyses of impacts summarized in **Chapter 2.3.1.2** and described in detail in **Chapter 4.1.1** are based on the development scenario, which is a set of assumptions and estimates on the amounts, locations, and timing for OCS oil and gas exploration, development, and production operations and facilities, both offshore and onshore. A detailed discussion of the development scenario and major related impact-producing factors is included in **Chapter 3**.

The difference between the potential impacts described for Alternative A and those under Alternative B is that under Alternative B no OCS oil- and gas-related activity would take place in the blocks subject to the Topographic Features Stipulation (**Figure 2-1**). The number of blocks that would not be offered under Alternative B represents only a small percentage of the total number of blocks to be

offered under Alternative A; therefore, it is assumed that the levels of activity for Alternative B would be similar to those projected for Alternative A. As a result, the impacts expected to result from Alternative B would be very similar to those described under the CPA proposed action (**Chapter 4.1.1**). Regional impact levels for all resources, except for the topographic features, would be similar to those described under the CPA proposed action. This alternative, if adopted, would prevent any OCS oil- and gas-related activity whatsoever in the affected blocks; thus, it would eliminate any potential direct impacts to the biota of those blocks from OCS oil- and gas-related activities, which otherwise would be conducted within the blocks.

2.3.3. Alternative C—No Action

2.3.3.1. Description

Alternative C is the cancellation of the proposed CPA lease sale. If this alternative is chosen, the opportunity for development of the estimated 0.460-0.894 BBO and 1.939-3.903 Tcf of gas that could have resulted from the proposed CPA lease sale would not occur as tentatively scheduled, but it could again be contemplated as part of another proposed lease sale in the 2017-2022 Five-Year Program. Proposed CPA Lease Sale 247 is the last CPA lease sale in the 2012-2017 Five-Year Program. Typically, in past Five-Year Programs, there were planning area lease sales, with one CPA lease sale per year. However, the 2017-2022 Five-Year Program may have two regionwide lease sales each year, and future lease sales will be dependent on decisions in the 2017-2022 Five-Year Program (USDOI, BOEM, 2015b). The No Action alternative, therefore, encompasses the same potential impacts as a decision to delay the proposed CPA lease sale to a later scheduled lease sale under the 2017-2022 Five-Year Program, when another decision on whether to hold that future lease sale is made. Delay of the proposed CPA lease sale was not considered as a separate alternative because the potential impacts are the same, namely that most impacts related to Alternative A would not occur as described above. Any potential environmental impacts resulting from the proposed CPA lease sale would not occur or would be postponed to a future lease sale decision.

2.3.3.2. Summary of Impacts

Cancelling the proposed CPA lease sale would eliminate the effects described for Alternative A (**Chapter 4.1.3**). The incremental contribution of the proposed CPA lease sale to the cumulative effects would also be foregone, but the effects from other activities, including other previous OCS lease sales, would remain. Moreover, if the proposed CPA lease sale was cancelled, the resulting development of oil and gas could be reevaluated under a future proposed CPA lease sale. Therefore, the overall level of OCS oil- and gas-related activity in the CPA would only be reduced by a small percentage, if any, and the cancellation of the proposed CPA lease sale would not significantly change the environmental impacts of overall OCS oil- and gas-related activity in the short term at least. However, the cancellation of the proposed CPA lease sale could result in direct economic impacts to the individual companies. Revenues collected directly by the Federal Government (and thus revenue disbursements to the States) would be adversely affected as would indirect revenue to the States from income tax, sales tax, etc.

If the proposed CPA lease sale was cancelled, then other sources of energy could potentially be substituted for the lost production. Principal substitutes would be additional imports, conservation, additional domestic production of oil and gas in other areas, and other fuels. These alternatives, except conservation, have significant negative environmental impacts of their own. For example, the tankering of fuels from alternate sources over longer distances may have significant potential negative impacts, including the risk of spills in the Gulf of Mexico.

CHAPTER 3

IMPACT-PRODUCING FACTORS AND SCENARIO

3. IMPACT-PRODUCING FACTORS AND SCENARIO

3.1. IMPACT-PRODUCING FACTORS AND SCENARIO—ROUTINE OPERATIONS

3.1.1. Offshore Impact-Producing Factors and Scenario

Chapter 3.1.1 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS describes the offshore infrastructure and activities (impact-producing factors) associated with a CPA proposed action (i.e., a typical lease sale) within the CPA that could potentially affect the biological, physical, and socioeconomic resources of the Gulf of Mexico.

In addition, these chapters describe the OCS Program's cumulative activity scenario resulting from past and future lease sales in the WPA, CPA, and EPA that could potentially affect biological, physical, and socioeconomic resources within the Gulf of Mexico. Note that offshore and onshore impact-producing factors and scenarios associated with a WPA or an EPA proposed action (i.e., a typical lease sale that would result from a proposed action within the WPA or EPA), as well as OCS Program activity resulting from past and future lease sales in the WPA or EPA, are disclosed in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, WPA 238/246/248 Supplemental EIS, WPA 246/248 Supplemental EIS, EPA 225/226 EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

Offshore is defined, for the purposes of this Supplemental EIS, as the OCS portion of the GOM that begins 3 marine leagues (9 nmi; 10.36 mi; 16.67 km) offshore Texas and Florida and 3 nmi (3.45 mi; 5.56 km) offshore Louisiana, Mississippi, and Alabama. The OCS extends seaward to the limits of the United States' jurisdiction over the continental shelf in water depths up to approximately 3,346 m (10,978 ft), which comprises the Exclusive Economic Zone (**Figure 1-1**). Coastal infrastructure and activities associated with a CPA proposed action are described in **Chapter 3.1.2**.

BOEM projects that the majority of the oil and natural gas fields discovered as a result of the CPA proposed action will reach the end of their economic life within a time span of 40 years following a lease sale. Therefore, activity levels are not projected beyond 40 years for this document. Although unusual cases exist where activity on a lease may continue beyond 40 years, BOEM's forecasts indicate that most significant activities associated with exploration, development, production, and abandonment of leases in the GOM occur well within the 40-year analysis period. For the cumulative case analysis, total OCS Program exploration and development activities are also forecast over a 40-year period. For modeling purposes and quantitative OCS Program activity analyses, a 40-year analysis period is also used. Exploration and development activity forecasts become increasingly more uncertain as the length of time of the forecast increases and the number of influencing factors increases.

BOEM uses a series of spreadsheet-based, data analysis tools to develop the forecasts of oil and gas exploration, discovery, development, and production activity for a CPA proposed action and OCS Program scenarios presented in this Supplemental EIS. Our analyses incorporate all relevant historical activity and infrastructure data, and our resulting forecasts are analyzed and compared with actual historical data to ensure that historical precedent and recent trends are reflected in each activity forecast.

BOEM is confident that our analysis methodology, with adjustments and refinements based on recent activity levels, adequately projects Gulf of Mexico OCS oil- and gas-related activities in both the short term and the long term for the Supplemental EIS analyses.

The CPA proposed action and the Gulfwide OCS Program scenarios are based on the following factors:

- resource estimates developed by BOEM;
- recent trends in the amount and location of leasing, exploration, and development activity;
- estimates of undiscovered, unleased, economically recoverable oil and gas resources in each water-depth category and each planning area;
- existing offshore and onshore oil and/or gas infrastructure;
- published data and information;

- industry information; and
- oil and gas technologies, and the economic considerations and environmental constraints of these technologies.

Proposed CPA Lease Sale 247 represents 3-4 percent of the OCS Program activities expected in the CPA from 2012 through 2051 based on barrels of oil equivalent (BOE) resource estimates and 3 percent of the total OCS Program (WPA, CPA, and EPA) from 2012 through 2051.

Specific projections of activities associated with the CPA proposed action (a typical lease sale) are discussed in the following scenario sections. The potential impacts of the projected activities associated with a proposed "typical" lease sale are considered in the environmental analysis section (**Chapter 4.1.1**).

The OCS Program scenario includes all activities that are projected to occur from past, proposed, and future lease sales during the analysis period. This includes projected activity from lease sales that have been held, including the most recent CPA Lease Sale 235 (March 2015), but for which exploration or development has either not yet begun or is continuing. Activities that take place beyond the analysis timeframe as a result of future lease sales are not included in this analysis. The impacts of activities associated with the OCS Program on biological, physical, and socioeconomic resources are analyzed in the cumulative environmental analysis sections (**Chapter 4.1.1**).

3.1.1.1. Resource Estimates and Timetables

The CPA proposed action and cumulative case have not changed since last analyzed for the CPA 241/247 and EPA 226 Supplemental EIS. BOEM has not identified any new information or change in circumstances since publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS that would change the estimates and timetables.

3.1.1.1.1. Proposed Action

The proposed action scenarios are used to assess the potential impacts of a proposed typical lease sale. The resource estimates for a proposed action are based on two factors: (1) the conditional estimates of undiscovered, unleased, conventionally recoverable oil and gas resources in the proposed lease sale area; and (2) estimates of the portion or percentage of these resources assumed to be leased, discovered, developed, and produced as a result of a proposed action. Due to the inherent uncertainties associated with an assessment of undiscovered resources, probabilistic techniques were employed and the results were reported as a range of values corresponding to different probabilities of occurrence. The estimates of the portion of the resources assumed to be leased, discovered, developed, and produced as a result of a proposed action are based upon logical sequences of events that incorporate past experience, current conditions, and foreseeable development strategies. Historical databases and information derived from oil and gas exploration and development activities are available to BOEM and were used extensively in the development of these scenarios. The undiscovered, unleased, conventionally recoverable resource estimates for a proposed action are expressed as ranges, from low to high. This range provides a reasonable expectation of anticipated oil and gas production from a typical lease sale held as a result of a proposed action based on an actual range of historic observations.

Table 3-1 presents the projected oil and gas production for a typical lease sale and cumulatively for the OCS Program (between 2012 and 2051) based on planning areas. **Table 3-2** provides a summary of the major scenario elements of the proposed action, a typical lease sale, and some of the related impact-producing factors for the CPA proposed action. To analyze impact-producing factors for the proposed action and the OCS Program, the proposed lease sale areas were divided into an offshore subarea based upon ranges in water depth. **Figure 3-1** depicts the location of the offshore subareas. The water-depth range reflects the technological requirements and related physical and economic impacts as a consequence of the oil and gas potential, exploration and development activities, and lease terms unique to each water-depth range. Estimates of resources and facilities are distributed into each of the subareas.

Proposed Action Scenario (CPA Typical Lease Sale): The estimated amounts of resources projected to be leased, discovered, developed, and produced as a result of a typical proposed CPA lease sale are 0.460-0.894 BBO and 1.939-3.903 Tcf of gas.

Offshore and onshore impact-producing factors and scenarios associated with a WPA or an EPA proposed action (i.e., a typical lease sale that would result from a proposed action within the WPA or EPA), as well as OCS Program activity resulting from past and future lease sales in the WPA or EPA, are disclosed in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, WPA 238/246/248 Supplemental EIS, WPA 246/248 Supplemental EIS, EPA 225/226 EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

The numbers of exploration and delineation wells, production platforms, and development wells projected to develop and produce the estimated resources for the CPA proposed action are given in **Table 3-2**. These tables show the distribution of these factors by the offshore subarea in the proposed lease sale areas. **Table 3-2** also includes estimates of the major impact-producing factors related to the projected levels of exploration, development, and production activity.

Exploratory drilling activity typically takes place over an 8-year period, beginning within 1 year after the lease sale. Development activity typically takes place over a 39-year period, beginning with the installation of the first production platform and ending with the drilling of the last development wells. Production of oil and gas typically begins by the third year after the lease sale and continues to the 40th year (and in some limited cases beyond).

3.1.1.1.2. OCS Program

OCS Program Cumulative Scenario (WPA, CPA, and EPA): Projected reserve/resource production for the OCS Program is 18.335-25.640 BBO and 75.886-111.627 Tcf of gas and represents anticipated production from lands currently under lease plus anticipated production from future lease sales over the 40-year analysis period. The OCS Program cumulative scenario includes WPA, CPA, and EPA production estimates. **Table 3-3** presents all anticipated production from lands currently under lease in the WPA, CPA, and EPA plus all anticipated activity from future total OCS Program (WPA, CPA, and EPA) lease sales over the 40-year analysis period.

WPA Cumulative Scenario: Projected reserve/resource production for the OCS Program in the WPA (2.510-3.696 BBO and 12.539-18.434 Tcf of gas) represents all anticipated production from lands currently under lease in the WPA plus all anticipated production from future WPA lease sales over the 40-year analysis period. Projected production represents approximately 14 percent of the oil and 17 percent of the gas of the total Gulfwide OCS Program. The impact-producing factors, affected environment, and environmental consequences related to the WPA cumulative OCS Program activities have been disclosed and addressed in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, WPA 238/246/248 Supplemental EIS, and WPA 246/248 Supplemental EIS. The WPA cumulative scenario is included in this Supplemental EIS in the context of the OCS Program, as the OCS Program covers all three panning areas.

CPA Cumulative Scenario: Projected reserve/resource production for the OCS Program in the CPA (15.825-21.733 BBO and 63.347-92.691 Tcf of gas) represents all anticipated production from lands currently under lease in the CPA plus all anticipated production from future CPA lease sales over the 40-year analysis period. Projected production represents approximately 85-86 percent of the oil and 83 percent of the gas of the total Gulfwide OCS Program. **Table 3-4** presents projections of the major activities and impact-producing factors related to future cumulative OCS Program activities in the CPA over the 40-year analysis period. The impact-producing factors, affected environment, and environmental consequences related to the CPA cumulative OCS Program activities have been disclosed and addressed in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

EPA Cumulative Scenario: Projected reserve/resource production for the OCS Program in the EPA (0-0.211 BBO and 0-0.502 Tcf of gas) represents all anticipated production from lands currently under lease in the EPA plus all anticipated production from future EPA lease sales over the 40-year analysis period. Projected production represents approximately less than 1 percent of the oil and gas of the total Gulfwide OCS Program. Table 3-3 of the EPA 225/226 EIS presents projections of the major activities and impact-producing factors related to future cumulative OCS Program activities in the EPA over the 40-year analysis period. The impact-producing factors, affected environment, and environmental consequences related to the EPA cumulative OCS Program activities have been disclosed and addressed in the EPA 225/226 EIS and CPA 241/247 and EPA 226 Supplemental EIS.

3.1.1.2. Exploration and Delineation

3.1.1.2.1. Seismic Surveying Operations

Prelease exploration surveys are comprised of geological and geophysical (G&G) surveys performed on or off leased areas. The most prevalent surveys used are seismic surveys with airguns/airgun arrays as acoustic sources, which are focused most commonly (but not always) on deeper targets and collectively authorized under the Bureau of Ocean Energy Management's G&G permitting process. Postlease (ancillary) G&G surveys collect data on hazards, drilling, reservoir monitoring, and archaeological resources. There are also surficial or near-surface surveys conducted to identify potential shallow geologic hazards for geotechnical engineering and site planning for bottom-founded structures. Noise associated with OCS oil and gas development results from various G&G surveys, the operation of fixed structures such as offshore platforms and drilling rigs, and helicopter and service-vessel traffic. Noise sources related to a CPA proposed action are discussed in **Chapter 3.1.1.6** of this Supplemental EIS and **Chapter 3.1.1.6** of the 2012-2017 WPA/CPA Multisale EIS.

CPA Proposed Action Scenario (Typical Lease Sale): Because of the cyclic nature in the acquisition of G&G surveys, a prelease airgun survey would be attributable to lease sales held up to 7-9 years after the survey was completed. Based on an amalgam of historical trends in G&G permitting and industry input, BOEM projects that proposed lease sales within the WPA, CPA, and EPA would result in 29,197 OCS blocks surveyed by 2D and 3D airgun surveys for the years 2012-2017. This breaks down per planning area as follows: WPA ~7,300 blocks; CPA ~21,314 blocks; and EPA ~583 blocks. (Note that the number of blocks could include multiple surveys on a single block that would then be counted as a unique block survey each time.) For postlease ancillary G&G surveys, information obtained from specific seismic contractors specializing in high resolution seismic acquisition in the GOM, project that the proposed action would result in about 50 vertical seismic profiling (VSP) airgun sourced surveys and 629 non-airgun, high-resolution surveys covering approximately 226,400 line miles (364,420 km) of near-surface and shallow penetration seismic for the years 2012-2017.

Chapter 3.1.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS describes in detail ocean-bottom surveys related to a CPA proposed action.

OCS Program Cumulative Scenario (WPA, CPA, and EPA): The G&G survey activity levels are projected to follow the same trend as exploration drilling activities. These activities, which peaked in 2008-2010, are projected to steadily decline until 2027, and will potentially remain relatively steady throughout the second half of the 40-year analysis period. It is important to note that the cycling of G&G data acquisition is not driven by the 40-year life cycle of productive leasing, but instead it will trend to respond to new production or potential new production driven by new technology. Consequently, some areas will be resurveyed in 2-year cycles, while other areas, considered nonproductive, may not be surveyed for 20 years or more.

Assuming that seismic acquisition will remain the dominant exploration survey used by industry in the future and that a number of surveyed blocks will be resurveyed several more times, BOEM makes the following projections. During the first 5 years (2012-2017) of the 40-year analysis period (2012-2051), BOEM projects the following annual activities: 50 VSP airgun surveys; 226,400 line miles (364,420 km) of non-airgun, high-resolution surveys; and 29,197 3D blocks surveyed by deep-penetration airgun arrays, including areas that will be resurveyed. Expanding this analysis to the first 20 years (2012-2032), the annual projections would be 60 VSP airgun surveys, 400,000 line miles (740,800 km) surveyed by high-resolution non-airguns, and 33,000 blocks of 2D/3D deep-penetration airgun surveys (60% in the CPA, 10% in the EPA, and 30% in the WPA). During the second half of the 40-year analysis period, the annual projection would be approximately 40 VSP airgun surveys, 240,000 line miles (444,480 km) surveyed by high-resolution non-airguns, and 15,000-20,000 blocks surveyed by deep-penetration airgun surveys annually (50% in the CPA, 20% in the EPA, and 30% in the WPA).

3.1.1.2.2. Exploration and Delineation Plans and Drilling

Chapter 3.1.1.2.2 of the 2012-2017 WPA/CPA Multisale EIS describes in detail exploration and delineation plans and drilling related to a CPA proposed action. Oil and gas operators use drilling terms that represent stages in the discovery and exploitation of hydrocarbon resources. An exploration well generally refers to the first well drilled on a prospective geologic structure to confirm that a resource exists and to validate how much resource can be expected. If a resource is discovered in quantities that

appear economically viable, one or more follow-up delineation wells help define the amount of resource or the extent of the reservoir. Following a discovery, an operator will often temporarily plug and abandon a discovery well to allow time for a development scenario to be generated and for equipment to be built or procured.

In the GOM, exploration and delineation wells are typically drilled with mobile offshore drilling units (MODUs), e.g., jack-up rigs, semisubmersible rigs, submersible rigs, platform rigs, or drill ships. Non-MODUs, such as inland barges, are also used as drilling rigs. The type of rig chosen to drill a prospect depends primarily on water depth. Because the water-depth ranges for each type of drilling rig overlap to a degree, other factors such as rig availability and daily operation rates play a large role when an operator decides upon the type of rig to contract. The depth ranges for exploration rigs used in this analysis for the Gulf of Mexico are indicated below.

MODU or Drilling Rig Type	Water Depth Range
Jack-up, submersible, and inland barges	≤100 m (328 ft)
Semisubmersible and platform rig	100-3,000 m (328-9,843 ft)
Drillship	≥600 m (1,969 ft)

Historically, drilling rig availability has been a limiting factor for activity in the GOM and is assumed to be a limiting factor for activity projected as a result of a proposed lease sale. Drilling activities may also be constrained by the availability of rig crews, shore-based facilities, risers, and other equipment.

The scenario for a proposed action assumes that an average exploration well will require 30-120 (average of 60) days to drill. The actual time required for each well depends on a variety of factors, including the depth of the prospect's potential target zone, the complexity of the well design, and the directional offset of the wellbore needed to reach a particular zone. This scenario assumes that the average exploration or delineation well depth will be approximately 4,572-7,010 m (15,000-23,000 ft) below the mudline.

Some delineation wells may be drilled using a sidetrack technique. In sidetracking a well, a portion of the existing wellbore is plugged back to a specific depth, directional drilling equipment is installed, and a new wellbore is drilled to a different geologic location. The lessee may use this technology to better understand the prospect and to plan future wells. Use of this technology may also reduce the time and exploration expenditures needed to help evaluate the prospective horizons on a new prospect.

The cost of an average exploration well can be $40-$150 million or more, without certainty that objectives can be reached. Some recent ultra-deepwater exploration wells (>6,000-ft [1,829-m] water depth) in the GOM have been reported to cost upwards of $200 million. The actual cost for each well depends on a variety of factors, including the depth of the prospect's potential target zone, the complexity of the well design, and the directional offset of the wellbore needed to reach a particular zone.

Subpart D of BSEE's regulations (30 CFR part 250) specifies requirements for drilling activities. Refer to **Chapter 1.3.1** of this Supplemental EIS, Chapter 1.3.1 and Table 1-2 of the 2012-2017 WPA/CPA Multisale EIS, Chapter 1.3.2 of the WPA 233/CPA 231 Supplemental EIS, and Chapter 1.3.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, which provide a summary of new and updated safety requirements related to the CPA proposed action.

CPA Proposed Action Scenario (Typical Lease Sale): BOEM estimates that 168-329 exploration and delineation wells would be drilled as a result of the CPA proposed action. **Table 3-2** shows the estimated range of exploration and delineation wells by water-depth range. Greater than 50 percent of the projected wells for the CPA proposed action is expected to be on the continental shelf (0-200 m [0-656 ft] water depth).

CPA Cumulative Scenario: BOEM estimates that 5,270-8,110 exploration and delineation wells would be drilled as a result of all cumulative OCS Program activities in the CPA (**Table 3-4**).

OCS Program Cumulative Scenario (WPA, CPA, and EPA): BOEM estimates that 6,910-9,827 exploration and delineation wells would be drilled in the WPA, CPA, and EPA as a result of all active OCS leases from the current and previous Five-Year Programs. **Table 3-3** shows the estimated range of exploration and delineation wells by water-depth range for the OCS Program activities (WPA, CPA, and EPA). Of these wells, approximately 55 percent are expected to be on the continental shelf (0-200 m [0-656 ft] water depth) and approximately 45 percent are expected in intermediate water-depth ranges and

deeper (>200 m; 656 ft). Note that offshore and onshore impact-producing factors and scenarios associated with a WPA or an EPA proposed action (i.e., a typical lease sale that would result from a proposed action within the WPA or EPA), as well as OCS Program activity resulting from past and future lease sales in the WPA or EPA, are disclosed in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, WPA 238/246/248 Supplemental EIS, WPA 246/248 Supplemental EIS, EPA 225/226 EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

3.1.1.3. Development and Production

Development and Production Drilling

Following a successful exploration program (i.e., one that results in the discovery of an economically viable oil and/or gas field), operators of OCS leases must engage in a series of field development and production drilling activities in order to extract the discovered oil and/or gas reserves from the subsurface. If, however, the exploration program results in failure, future activity on the lease is minimal, and limited to short-duration activities are carried out to plug and permanently abandon the exploration wells drilled on the lease.

The initial activity associated with a field development and production drilling program typically is the drilling of delineation wells. Delineation wells are drilled to specific subsurface targets in order to obtain information about the reservoir that can be used by the operator to identify the lateral and vertical extent of a hydrocarbon accumulation. Depending on the information obtained from delineation well drilling, these wells can be completed and prepared to serve as production wells. Production wells are wells that are drilled following the delineation stage of the development program. The production well is drilled specifically for the purpose of extracting hydrocarbons from the subsurface and therefore must be positioned within the reservoir in locations where the greatest volume of production can be realized. Wells initially drilled as delineation wells that are later converted to production wells and wells drilled as production wells are sometimes collectively referred to as development wells.

Following the drilling of development wells, the operator of a field may decide to remain on location and immediately begin the next stage of the field development program, i.e., preparing the development wells for production. However, there are a number of reasons (e.g., when additional well tests are required or if the drilling rig is committed to another location) that the operator may decide to move off location and delay the work required to prepare the wells for production. When a decision to delay the work is chosen, each development well must be temporarily abandoned before the drilling rig can be moved to another location. It is also not uncommon for an operator to drill the required number of development wells in stages, leaving some time period in between the well drill stages to evaluate the information obtained from the wells and, if necessary, use this information to modify the development program.

Well Completions

The process that includes the suite of activities that are carried out to prepare a development well for production is the completion process.[1] BOEM has reviewed the *Programmatic Environmental Assessment on the Use of Well Stimulation Treatments on the Pacific Outer Continental Shelf: Final Programmatic EA* (USDOI, BSEE and USDOI, BOEM, 2016). While the techniques used in the Pacific OCS are similar to procedures in the GOM, activities and potential impacts differ greatly between the Pacific and Gulf of Mexico OCS due to a variety of factors (e.g., different reservoir properties and different affected environment). The primary impact-producing factor of concern related to well stimulation activities in the Gulf of Mexico OCS would be discharges of well treatment, completion, and workover (TCW) fluids. Well TCW fluids are comingled with other produced fluids and regulated as produced water through the National Pollution Discharge Elimination System (NPDES) permit process

[1]As described below, there is a wide range of variability in the particular activities that might be used in the completion process depending on the specific characteristics of the well. Many of the terms used to describe these activities (e.g., fracking and acidization) do not have precise, fixed definitions in all contexts. Accordingly, two very different processes with different potential environmental impacts may both be called by the same name. For these reasons, the description of these activities in this chapter is meant to be a general description of the range of activities that may be involved in well completion.

(refer to **Chapter 3.1.1.4**). The primary drivers of offshore completions in the GOM are sand control and formation stimulation, with an extensive history of successful application. When the decision is made to perform a well completion, a new stage of activity begins.

There is a wide variety of well completion techniques performed in the Gulf of Mexico, and the type of well completion used to prepare a drill well for production is based on the rock properties of the reservoir as well as the properties of the reservoir fluid. However, for the vast majority of well completions, the typical process includes installing or "running" the production casing; cementing the casing; perforating the casing and surrounding cement in the target formation; injecting water, brine, or gelled brine as carrier fluid for frac pack/sand proppant pack and gravel pack; treating/acidizing the reservoir formation near the wellbore; installing production screens; running production tubing; and installing a production tree. Casing is run in the well to prevent the well from collapsing. Cement is pumped into the well both to displace drilling fluids that remain in the well and also to fill in the space that exists between the casing and the face of the rock formations in the wellbore. The casing and cement are perforated adjacent to the reservoir to allow the reservoir fluids to enter the wellbore. A gravel pack is a filtration system that is used to prevent sand from entering the wellbore. Well treatment, such as acidizing, is used to improve the flow of reservoir fluids into the wellbore by cleaning out and/or dissolving debris that accumulates in the wellbore and near-wellbore reservoir formation as a result of the drilling process. For moderate to high permeability reservoirs, today's most technologically advanced well treatment and stimulation processes are designed not only to mitigate near-wellbore formation damage issues but also to serve as another mechanism to help control the flow of sand into the wellbore and to enhance the flow rate of the well. Production tubing is run inside the casing. Production tubing protects the casing from wear and corrosion, and it provides a continuous conduit for the reservoir fluid to flow from the reservoir to the wellhead. The production tree is a wellhead device that is used to control, measure, and monitor the conditions of the reservoir and the well from the surface.

A commonly used development well completion and stimulation technique that has been used in the Gulf of Mexico for more than 25 years is a combined fracturing and gravel packing technique, referred to as a fracture pack or "frac-pack" completion, which combines the production improvement from hydraulic fracturing with the sand control provided by gravel packing. Typically, about 30-35 percent of the oil present in the reservoir at the start of production is recovered during primary recovery (Hyne, 2012). The use of well stimulation treatments supports the continued recovery of oil as the primary recovery of an oil and/or gas reservoir declines. These activities are covered by a permit known as an Application for Permit to Modify. Applications for Permit to Modify are reviewed and approved by the BSEE. BOEM carries forward any established mitigating measures based upon lease stipulations/terms, regulatory requirements, etc., to the individual plan actions.

The term hydraulic fracturing covers a broad range of techniques used to stimulate and improve production from a well. Fracture fluid is injected into a wellbore at high pressure to break open the rock to create/improve the flow path for hydrocarbon to flow into the well. This completion technique, which is typically used for moderate to high permeability reservoirs, is used to reduce the movement of sand and other fine particulate matter within the reservoir, reduce the concentration of sand and silt in the produced fluids, improve the flow of reservoir fluids into the wellbore, increase production rates, and maximize production efficiency. The frac-pack completion process uses pressurized fluids, typically seawater, brine, or gelled brine, to create small fractures in the reservoir rock within a zone near the wellbore where the reservoir's permeability was damaged by the drilling process. The pressurized high-density, gelatin-like fluid also serves as the carrier agent for the mechanical agent or proppant that is mixed with the completion fluids. The mechanical agents (i.e., proppant), typically sand, manmade ceramics, or small microspheres (tiny glass beads), are injected into the small fractures and remain lodged in the fractures when the process is completed. The proppant serves to hold the fractures open, allowing them to perform as conduits to assist the flow of hydrocarbons from the reservoir formation to the wellbore. Well treatment chemicals are also commonly used to improve well productivity. For example, acidizing (a nonfracturing treatment) a reservoir to dissolve cementing agents and improve fluid flow is a common well treatment procedure in the GOM.

In contrast to the large-scale, induced hydraulic fracturing procedures, commonly referred to as "fracking," used in onshore oil and gas operations for low-permeability "tight gas," "tight oil," and "shale gas," reservoirs, the vast majority of hydraulic fracturing treatments carried out on the OCS in the GOM are "frac packs," which are small-scale by comparison and most commonly used for high-permeability formations to reduce the concentration of sand and silt in the produced fluids and to maintain high flow

rates. Since formation "damage" caused by drilling operations does not extend for large distances away from the reservoir-borehole interface, the fracturing induced by the procedure is also designed to remain in close proximity to the borehole, extending distances of typically 15-30 m (49-98 ft) from the borehole (Ali et al., 2002; Sanchez and Tibbles, 2007) to prevent the production of formation fines and sand.

Additives used in fracture-pack operations are often similar, if not identical, to those used for shale or tight sand development in other regions and are used for similar purposes. The concentrations of some of these additives are typically different due to the GOM's very different geologic characteristics of the producing formation. The most significant difference is that the GOM typically has much higher formation permeabilities and lower amounts of clay/shale in typical formations (API, 2015b). Another factor that can significantly influence additive selection and use in offshore operations is the ability to discharge treated wastewaters that meet applicable regulatory requirements (API, 2015b).

Boehm et al. (2001) notes 22 functional categories of additives and 2 categories of proppants used offshore in the GOM for fracturing activities:

- water-based polymers
- defoamers
- friction reducers
- oil gelling additives
- fluid loss additives
- biocides
- breakers
- acid-based gel systems
- emulsifiers
- water-based systems
- clay stabilizers
- crosslinked gel systems
- surfactants
- alcohol/water systems
- non-emulsifiers
- oil-based systems
- pH control additives
- polymer plugs
- crosslinkers
- continuous mix gel concentrates
- foamers
- resin-coated proppants
- gel stabilizers
- intermediate-to-high strength ceramic proppants

Each of these is described in greater detail in the Boehm et al. (2001) study, which is incorporated by reference, along with other treatment and completion chemicals. The appendix to the study even offers a chemical inventory with example products and Material Safety Data Sheets for those products. In general, discharges of any fluids, including those associated with well completion, are subject to the terms of NPDES permits issued by the USEPA under the Clean Water Act. These permits place limitations on the toxicity of specified effluents, as well as other requirements for monitoring and reporting. Wastes and discharges generated from OCS oil- and gas-related activities, including produced water and well completion fluids, are addressed programmatically by BOEM in Chapters 3.1.1.4 and 3.1.2.2.3 of the 2012-2017 WPA/CPA Multisale EIS, from which this Supplemental EIS is tiered.

During a "frac pack", the pumping equipment, sand (proppant), and additives are carried, mixed, and pumped from a specialized stimulation and treatment vessel. The base fluid that is used for the frac-pack operation will typically be treated seawater, although other brines may be used if conditions dictate (API, 2015b). BOEM considers these large special purpose vessels (supporting fracturing operations) as offshore supply/service vessels (OSVs). In **Table 3-2**, the number of OSV trips is estimated by subareas (range of water depths) in the GOM. Potential impacts associated with OSVs are described in various sections throughout **Chapter 3** of this Supplemental EIS; these impacts include operational wastes, noise, and air emissions related to vessel movement throughout the GOM.

What is explained above is a general procedure for frac-pack operation, but every fracturing job is case specific. In general, the fracturing process remains the same but chemical formulations, fluid and proppant volumes, pump time, and pressure will vary based on the depth and engineering/geologic parameters for a particular well completion. After a production test determines the desired production rate to avoid damaging the reservoir, the well is ready to go online and produce.

The development operations and coordination document (DOCD) is the chief planning document that lays out an operator's specific intentions for development. The range of postlease development plans is discussed in **Chapter 1.5**. BOEM estimates that approximately 80-90 percent of development wells would become producing wells. The majority of these production wells are anticipated to undergo some form of well stimulation during their production life, with many (>65% [Sanchez and Tibbles, 2007]) being frac-pack completions. Implementation of the well stimulation activities included in the proposed

action would largely use existing infrastructure and would not result in bottom-disturbing activities, except potentially the drilling of new injection wells.

CPA Proposed Action Scenario (Typical Lease Sale): It is estimated that 215-417 development and production wells will be drilled as a result of the CPA proposed action. **Table 3-2** shows the estimated range of development and production wells by water-depth subarea. The percentage of projected oil wells within the CPA is more evenly distributed throughout the water-depth ranges, with the greatest number of wells being forecasted for water depths >2,400 m (7,874 ft), whereas 66-75 percent of the gas wells are projected to be drilled on the continental shelf (0-200 m [0-656 ft] water depth).

CPA Cumulative Scenario: BOEM estimates that 7,080-10,020 development and production wells would be drilled as a result of all cumulative OCS Program activities in the CPA (**Table 3-4**).

OCS Program Cumulative Scenario (WPA, CPA, and EPA): It is estimated that 8,530-12,180 development and production wells would be drilled in the WPA, CPA, and EPA as a result of the proposed lease sales and all OCS oil- and gas-related activity associated with previous lease sales. **Table 3-3** shows the estimated range of development wells by water depth.

Note that offshore and onshore impact-producing factors and scenarios associated with a WPA or an EPA proposed action (i.e., a typical lease sale that would result from a proposed action within the WPA or EPA), as well as OCS Program activity resulting from past and future lease sales in the WPA or EPA, are disclosed in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, WPA 238/246/248 Supplemental EIS, WPA 246/248 Supplemental EIS, EPA 225/226 EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

Infrastructure Emplacement/Structure Installation and Commissioning Activities

Chapter 3.1.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS and Chapter 3.1.1.3 of the WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS describe in detail infrastructure emplacement/structure installation and commissioning activities related to a CPA proposed action.

Bottom-founded or floating structures may be placed over development wells to facilitate production from a prospect. These structures provide the means to access and control the wells. They serve as a staging area to process and treat produced hydrocarbons from the wells, initiate export of the produced hydrocarbons, conduct additional drilling or reservoir stimulation, conduct workover activities, and carry out eventual abandonment procedures. There is a range of offshore infrastructure installed for hydrocarbon production. Among these are pipelines, fixed and floating platforms, caissons, well protectors, casing, wellheads, and conductors.

CPA Proposed Action Scenario (Typical Lease Sale): It is estimated that 35-67 production structures will be installed as a result of the CPA proposed action. **Table 3-2** shows the projected number of structure installations for the CPA proposed action by water-depth range. About 80 percent of all the production structures installed for the CPA proposed action are projected to be on the continental shelf (0-60 m; 0-197 ft).

CPA Cumulative Scenario: BOEM estimates that 1,180-1,640 production structures would be installed as a result of all cumulative OCS Program activities in the CPA (**Table 3-4**).

OCS Program Cumulative Scenario (WPA, CPA, and EPA): It is estimated that 1,435-2,026 production structures would be installed in the WPA, and CPA, and EPA as a result of the proposed lease sales and all OCS oil- and gas-related activity associated with previous lease sales. **Table 3-3** shows the projected number of structure installations by water-depth range for the OCS.

Note that offshore and onshore impact-producing factors and scenarios associated with a WPA or an EPA proposed action (i.e., a typical lease sale that would result from a proposed action within the WPA or EPA), as well as OCS Program activity resulting from past and future lease sales in the WPA or EPA, are disclosed in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, WPA 238/246/248 Supplemental EIS, WPA 246/248 Supplemental EIS, EPA 225/226 EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

Bottom Area Disturbance

Chapter 3.1.1.3.2.1 of the 2012-2017 WPA/CPA Multisale EIS and Chapter 3.1.1.3 of the WPA 233/CPA 231 Supplemental EIS and CPA 235/241/247 Supplemental EIS describe in detail infrastructure emplacement/structure installation and commissioning activities related to the CPA proposed action.

Structures emplaced or anchored on the OCS to facilitate oil and gas exploration and production include drilling rigs or MODUs, pipelines , and fixed surface, floating, and subsea production systems. These are discussed in **Chapter 3.1.1.3** of this Supplemental EIS, Chapters 3.1.1.3.1 and 3.1.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS, and Chapter 3.1.1.3 of the WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS. The emplacement or removal of these structures disturbs small areas of the sea bottom beneath or adjacent to the structure. If mooring lines of steel, chain, or synthetic polymer are anchored to the sea bottom, areas around the structure can also be directly affected by their emplacement. This disturbance includes physical compaction or crushing beneath the structure or mooring lines and the resuspension and settlement of sediment caused by the activities of emplacement. Movement of floating types of facilities will also cause the movement of the mooring lines in the facilities' array. Small areas of the sea bottom will be affected by this kind of movement. Impacts from bottom disturbance are of concern near sensitive areas such as topographic features, pinnacles, low-relief live bottom features, chemosynthetic communities, high-density biological communities in water depths ≥400 m (1,312 ft), and archaeological sites. Site-specific mitigations are imposed to avoid seafloor communities.

Sediment Displacement

Chapter 3.1.1.3.2.2 of the 2012-2017 WPA/CPA Multisale EIS and Chapter 3.1.1.3 of the WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS describe in detail sediment displacement related to a CPA proposed action.

Displaced sediments are those that have been physically moved "in bulk." Displaced sediments will cover or bury an area of the seafloor, while resuspended sediments will cause an increase in turbidity of the adjacent water column. Resuspended sediments may include entrained heavy metals or hydrocarbons and will eventually settle, covering the surrounding seafloor.

Infrastructure Presence

Chapter 3.1.1.3.3 of the 2012-2017 WPA/CPA Multisale EIS and Chapter 3.1.1.3 of the WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS describe in detail impact-producing factors due to infrastructure presence related to a CPA proposed action.

The installation and maintenance of infrastructure may include, but is not limited to, the following:

- anchoring;
- offshore production systems;
- space-use requirements (deployment of survey equipment or bottom-founded production equipment);
- aesthetic quality (presence and visibility of equipment, vessels, and air traffic); and
- workovers and abandonments.

3.1.1.4. Operational Waste Discharged Offshore

The primary operational waste discharges generated during offshore oil and gas exploration and development are drilling fluids, drill cuttings, various waters (e.g., bilge, ballast, fire, and cooling), deck drainage, sanitary wastes, and domestic wastes. During production activities, additional waste streams include produced water, produced sand, and well treatment, workover, and completion fluids. Minor additional discharges occur from numerous sources. These discharges may include

desalination unit discharges, blowout preventer fluids, boiler blowdown discharges, excess cement slurry, several fluids used in subsea production, and uncontaminated freshwater and saltwater.

The USEPA, through general permits issued by the USEPA Region that has jurisdictional oversight, regulates all waste streams generated from offshore oil and gas activities. The USEPA Region 4 has jurisdiction over the eastern portion of the Gulf of Mexico OCS, including all of the EPA and a portion of the CPA off the coasts of Alabama and Mississippi (**Figure 3-2**). The USEPA Region 6 has jurisdiction over the rest of the CPA and all of the WPA.

Each USEPA Region has promulgated general permits for discharges that incorporate the 1993 effluent guidelines and 2001 effluent guidelines for synthetic-based fluids (SBF)-wetted cuttings as a minimum.

Permits issued under Section 402 of the Clean Water Act for offshore activities must comply with any applicable water quality standards and/or Federal water quality criteria, as well as Section 403 of the CWA. Water quality standards consist of the waterbody's designated uses, water quality criteria to protect those uses and to determine if they are being attained, and antidegradation policies to help protect high-quality waterbodies. Discharges from offshore activities near State water boundaries must comply with all applicable State water quality standards.

Section 403 of the Clean Water Act requires that NPDES permits for discharges to the territorial seas (baseline to 3 mi [5 km]), the contiguous zone, and the ocean be issued in compliance with USEPA's regulations for preventing unreasonable degradation of the receiving waters. Prior to permit issuance, ocean discharges must be evaluated against USEPA's published criteria for determination of unreasonable degradation. Unreasonable degradation is defined in the NPDES regulations (40 CFR § 125.1211e) as the following:

- significant adverse changes in ecosystem diversity, productivity, and stability of the biological community within the area of discharge and surrounding biological communities;
- threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms; and
- loss of aesthetic, recreational, scientific, or economic values, which is unreasonable in relation to the benefit derived from the discharge.

Chapter 3.1.1.4 of the 2012-2017 WPA/CPA Multisale EIS describes in detail impacting factors related to operational wastes discharged offshore, and Chapter 3.1.1.4 of the WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS provide a summary as well as updated information on stricter regulations regarding vessel discharges and produced water volumes. Operational wastes discharged offshore include the following:

- drilling muds and cuttings;
- produced waters;
- well treatment, workover, and completion fluids;
- production solids and equipment;
- bilge, ballast, and fire water;
- cooling water;
- deck drainage;
- treated domestic and sanitary wastes;
- minor discharges;
- vessel operational discharges; and
- distillation and reverse osmosis brine.

BOEM maintains records of the volume of water produced from each block on the OCS and its disposition—injected on lease, injected off lease, transferred off lease, or discharged overboard. The amount discharged overboard for the years 2000-2014 is summarized by water depth in **Table 3-5**, with new data provided for the year 2014 as well as any updates available for past years. The total volume for all water depths during this 14-year period ranged from 485.6 to 648.2 MMbbl, with the largest contribution (68-88%) coming from operations on the shelf. The total volume of produced water generally decreased after 2004, reflecting an overall decrease in contributions from operations on the shelf. The contribution of produced water from operations in deep water (>400-m [1,312-ft] water depth) and ultra-deepwater (>1,600-m [5,249-ft] water depth) production has been increasing. From 2000 to 2014, the contribution from these operations (deep and ultra-deepwater together) increased from 6 percent (37.8 MMbbl) to 31 percent (150.0 MMbbl) of the total produced-water volume (calculated from data in **Table 3-5**). The updated annual amounts and depth distributions of produced water discharged by depth are within the range of or similar to data presented in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS. Thus, this new information did not change the validity of the operational wastes discussions previously presented.

3.1.1.5. Air Emissions

In 1990, pursuant to Section 328 of the Clean Air Act Amendments and following consultation with the Commandant of the U.S. Coast Guard (USCG) and the Secretary of the Interior, the U.S. Environmental Protection Agency (USEPA) assumed air quality responsibility for the OCS waters in the GOM east of longitude 87.5^{o} W., and this Agency retained National Ambient Air Quality Standards (NAAQS) air quality jurisdiction for OCS operations west of the same longitude in the GOM. However, in 2014, BOEM's air quality regulations underwent a comprehensive review to replace obsolete provisions and to ensure that updates in regulations are following improvements in scientific and technological information. BOEM's air quality regulations update is expected to be published within the next 2 years as of the publication of this Supplemental EIS.

There are many air emissions sources related to OCS oil and gas exploration, development, and production in the GOM. During the exploration stage, most OCS emissions are from non-platform sources and include combustion from the equipment used on a drilling rig or from fuel usage of a support vessel. During the production stage, most emissions are from platform emission sources and include boilers, diesel engines, combustion flares, fugitives, glycol dehydrators, natural gas engines, turbines, pneumatic pumps, pressure/level controllers, storage tanks, cold vents, and others. During the development stage, most OCS emissions are from non-platform emissions and include fuel usage of support or survey vessels to lay pipelines, install facilities, or map geologic formations and seismic properties.

Pollutants released by OCS oil- and gas-related sources include the NAAQS pollutants carbon monoxide (CO), nitrogen oxides (NO_x), particulate matter (PM), and sulfur dioxide (SO_2). Pollutants also released by OCS sources (NO_x and volatile organic compounds [VOC]) are precursors to ozone, which is formed by photochemical reactions in the atmosphere and is another NAAQS pollutant. Lastly, OCS oil- and gas-related sources release greenhouse gas (GHG) emissions, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).

The *Year 2011 Gulfwide Emissions Inventory Study* (Wilson et al., 2014) indicates that OCS oil and gas production platform and non-platform sources emit the majority of criteria pollutants and greenhouse gases in the GOM on the OCS, with the exception of SO_2 (primarily emitted from commercial marine vessels), and N_2O (from biological sources). The OCS oil and gas production platform and non-platform sources account for 90 percent of the total CO emissions, 73 percent of NO_x emissions, 68 percent of PM_{10} emissions, 42 percent of SO_2 emissions, 63 percent of VOC emissions, and 85 percent of the greenhouse gas emissions. Similar to the 2008 inventory (Wilson et al., 2010), natural gas engines on platforms represented the largest CO emission source, accounting for 47 percent of the total estimated CO emissions, and support vessels were the highest emitters of both NO_x and PM_{10}, accounting for 37 percent and 42 percent, respectively, of the total estimated emissions. Oil and natural gas production platform vents account for the highest percentage (29%) of the VOC emissions. Support vessels (32% of total emissions), production platform natural gas, diesel, and dual-fuel turbines (18% of total emissions), and commercial marine vessels (11% of total emissions) emit the majority of the greenhouse gas emissions.

3.1.1.6. Noise

Noise associated with OCS oil and gas development results from G&G surveys, the installation of structures, the operation of fixed structures such as offshore platforms and drilling rigs, the decommissioning and removal of structures, and helicopter and service-vessel traffic. Noise generated from these activities can be transmitted through both air and water, and may be long-lived or temporary. Offshore drilling and production involve various activities that produce a composite underwater noise field. The source level and frequency of the noise are highly variable, both between and among the various industry sources. Noise from proposed OCS oil- and gas-related activities may affect resources near the activities. Whether a sound is or is not detected by marine organisms depends both on the acoustic properties of the source (spectral characteristics, intensity, and transmission patterns) and the sensitivity of the hearing system in the marine organism. Noise can cause varying degrees of harassment and/or behavioral responses to exposed animals, which may include, for example, interruptions to feeding, mating, migrating, communication, and/or alteration of hearing (temporary or permanent threshold shift).

Chapter 3.1.1.6 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS describes in detail noise-related impact-producing factors associated with OCS oil and gas development for a CPA proposed action.

3.1.1.7. Major Sources of Oil Inputs in the Gulf of Mexico

Petroleum hydrocarbons can enter the GOM from a wide variety of sources. The major sources of oil inputs in the GOM are natural seepage, permitted produced-water discharges, land-based discharges, and accidental spills. Numerical estimates of the contributions for these sources to the GOM coastal and offshore waters are shown in Tables 3-8 and 3-9 of the 2012-2017 WPA/CPA Multisale EIS. Chapter 3.1.1.7 of the 2012-2017 WPA/CPA Multisale EIS describes in detail major sources of oil inputs in the Gulf of Mexico, including natural seepage, produced water, land-based discharges, and spills.

Chapter 3.1.1.7.4 of the 2012-2017 WPA/CPA Multisale EIS also provides the following information related to oil spills:

- trends in reported spill volumes and numbers;
- projections of future spill events;
- OCS oil- and gas-related offshore oil spills;
- non-OCS oil- and gas-related offshore spills;
- OCS oil- and gas-related coastal spills;
- non-OCS oil- and gas-related coastal spills; and
- other sources of oil.

3.1.1.8. Offshore Transport

Offshore transport includes both movements of oil and gas products as well as the transportation of equipment and personnel. These include pipelines (installation and maintenance, and landfalls), barges, oil tankers, and projections related to floating production, storage, and offloading systems, service vessels, and helicopter trips.

Chapter 3.1.1.8 of the 2012-2017 WPA/CPA Multisale EIS and CPA 235/241/247 Supplemental EIS describes in detail the sources of offshore transport and proposed action scenarios for a CPA proposed action.

3.1.1.9. Safety Issues

Safety issues related to OCS oil and gas development include the presence of hydrogen sulfide and sulfurous petroleum and shallow hazards. These safety issues are described in detail for a CPA proposed

action in Chapters 3.1.1.9.1 and 3.1.1.9.2 of the 2012-2017 WPA/CPA Multisale EIS. In addition, technologies continue to evolve to meet the technical, environmental, and economic challenges of deepwater development. These new and unusual technologies are described in Chapter 3.1.1.9.3 of the 2012-2017 WPA/CPA Multisale EIS.

3.1.1.10. Decommissioning and Removal Operations

During exploration, development, and production operations, the seafloor around activity sites within a proposed lease sale area becomes the repository of temporary and permanent equipment and structures. In compliance with Section 22 of BOEM's Oil and Gas Lease Form (BOEM-2005) and BSEE regulations (30 CFR §§ 250.1710 *et seq.—Permanently Plugging Wells* and 30 CFR §§ 250.1725 *et seq.—Removing Platforms and Other Facilities*), lessees are required to remove all seafloor obstructions from their leases within 1 year of lease termination or relinquishment. These regulations require lessees to sever bottom-founded structures and their related components at least 5 m (15 ft) below the mudline to ensure that nothing would be exposed that could interfere with future lessees and other activities in the area. The structures are generally grouped into two main categories depending upon their relationship either to the platform/facility (e.g., piles, jackets, caissons, templates, mooring devises, etc.) or to the well (e.g., wellheads, casings, casing stubs, etc.).

Decommissioning and removal operations, including a CPA proposed action and OCS Program scenarios, are described in detail in Chapter 3.1.1.10 of the 2012-2017 WPA/CPA Multisale EIS.

3.1.2. Coastal Impact-Producing Factors and Scenario

3.1.2.1. Coastal Infrastructure

A full description of coastal impact-producing factors and scenario is presented in Chapter 3.1.2 of the 2012-2017 WPA/CPA Multisale EIS, WPA/CPA 233/231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS. No new significant information was discovered that would alter impact conclusions based upon these operations. For more details refer to Chapter 3.1.2 of the 2012-2017 WPA/CPA Multisale EIS, WPA/CPA 233/231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS, which describe coastal impact-producing factors. The following information is a summary and update of information discussed in detail in the prior 2012-2017 Gulf of Mexico EISs, including the following:

- service bases;
- helicopter hubs;
- platform fabrication yards;
- shipbuilding and shipyards;
- pipecoating facilities and yards;
- refineries;
- gas processing plants;
- liquefied natural gas (LNG) facilities;
- pipeline shore facilities, barge terminals, and tanker port areas;
- coastal pipelines;
- coastal barging; and
- navigation channels.

Coastal oil- and gas-related infrastructure has developed over many decades in the Gulf of Mexico region; it is an extensive and mature system that provides support for offshore activities. The expansive presence of this coastal infrastructure is the result of long-term industry offshore and onshore trends and

is not subject to rapid fluctuations. The routine activities of built infrastructure associated with the CPA proposed action are regulated by Federal and State agencies through permitting processes, routine inspections, and a structured enforcement regime. Permit requirements largely mitigate any air and water quality impacts that can result from these activities. Because these impacts occur whether or not the CPA proposed action is implemented, the CPA proposed action would account for only a small percentage of these impacts.

A detailed description of the baseline affected environment for land use and coastal infrastructure in the CPA is provided in Chapter 4.2.1.23.1.1 of the 2012-2017 WPA/CPA Multisale EIS, and updated information is provided in **Chapter 4.1.1.23.1** of this Supplemental EIS, Chapter 4.2.1.23.1 of the WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.23.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. Chapter 3.1.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS describes in detail offshore infrastructure emplacement/structure installation and commissioning activities related to a CPA proposed action.

BOEM projects no new coastal infrastructure; however, any individual proposed action may result in one additional pipeline landfall and/or one additional gas processing facility as a result of an individual proposed action. While offshore projects may add additional miles of pipeline to transport product, it is not likely that these projects would transport natural gas or crude oil directly onshore, but rather interconnect with existing systems. Generally, it is more cost effective for companies to tie into the existing offshore pipeline network. Pipeline safety regulations govern the entire life of pipeline operations, including design, construction, inspection, recordkeeping, worker qualification, and emergency preparedness; and any new pipeline landfalls would be subject to regulatory requirements. Because of the long timelines associated with the Gulf of Mexico projects, the late 2014/early 2015 downturn in oil prices is expected to have minimal direct impact on GOM crude oil production through 2016. The U.S. Department of Energy's (DOE or USDOE's) Energy Information Administration projected GOM production to reach 1.52 MMbbl per day in 2015 and 1.61 MMbbl per day in 2016, or about 16 percent and 17 percent of total U.S. crude oil production in those 2 years, respectively. The current low oil prices adds uncertainty to the timelines of deepwater GOM projects, with projects in early development stages exposed to the greatest risk of delay (USDOE, Energy Information Administration, 2015f).

A service base is a community of businesses that load, store, and supply equipment, supplies, and personnel that are needed at offshore work sites. Service bases can range from large yards offering a range of services, including full logistics management to smaller shops that supply one or many of the items needed on an offshore platform or marine vessel. The GOM ports vary considerably by size, specialty, and defining characteristics. In general, however, there are two major types of port facilities: deep-draft seaports and inland river and intra-coastal waterways port facilities (Dismukes, 2011). While no proposed action is projected to significantly change existing OCS oil- and gas-related service bases or ports, or require any additional ports or service bases, the CPA proposed action would contribute to the use of these coastal infrastructure types. Round-trip service vessel trips as a result of the CPA proposed action are projected between 94,000 and 168,000 over the 40-year planning period (**Table 3-2**). For a more in depth discussion of service vessels, refer to **Chapter 3.1.1.8**.

Chapter 4.2.1.23.1 describes shipbuilding and shipyards in the analysis areas. In the GOM region, there is a direct correlation between oil and gas activities and the demand or opportunities for expanding shipbuilding and offshore support vessels. There are 137 shipyards in the analysis area, with the highest concentration in Louisiana at 64; there are 32 in Texas, 9 in Mississippi, 18 in Alabama, and 14 in Florida (Dismukes, 2011). No new facilities are expected to be constructed as a result of the CPA proposed action or in support of OCS Program activities. There is more than an adequate supply of shipyard resources in the GOM. No new facilities are expected to be constructed in support of OCS Program activities. Some shipyards may close, be bought out, or merge over the 2012-2051 period, resulting in fewer active yards in the analysis area.

If offshore oil and gas activity levels increase, it is reasonable to assume that heliport facilities may expand to meet demand. Helicopter hubs or "heliports" are facilities where helicopters can land, load, and offload passengers and supplies, refuel, and be serviced. These hubs are used primarily as flight support bases to service the offshore oil and gas industry. Most of the helicopter operations originate at helicopter hubs in coastal Louisiana (Dismukes, 2011). Helicopter operations for the CPA proposed action are projected between 696,000 and 1,815,000 round-trip operations over the 40-year planning

period (**Table 3-2**). No new heliports are projected as a result of the OCS Program; however, if activity levels increase, current locations may expand.

The DOE's Energy Information Administration updates national energy projections annually, including refinery capacity. A crude oil refinery is a group of industrial facilities that turns crude oil and other inputs into finished petroleum products. There has been a trend toward constructing simple refineries instead of complex refineries. In the GOM analysis area, a new simple refinery was constructed in 2014 in Galena Park, Texas (U.S. Dept. of Energy, Energy Information Administration, 2016a). Two new simple refineries began operating in 2015, Petromax Refining Co began operating a 25,000 b/cd refinery in Houston and Buckeye Partners LP began operating a 46,250 b/cd condensate processing facility in Corpus Christi. In the United States, the last new construction complex refinery with significant downstream unit capacity started operating in 1977 in Garyville, Louisiana. No new facilities are expected to be constructed as a direct result of the CPA proposed action.

Navigation channels undergo maintenance dredging that is essential for sustaining proper water depths to allow ships to move safely through the waterways to ports, services bases, and terminal facilities. In the northern GOM, the existing system of navigation channels is projected to be adequate to allow proper accommodation for vessel traffic that will occur as a result of a single CPA proposed action. The Gulf-to-port channels and the Gulf Intracoastal Waterway that support prospective OCS ports are maintained by regular dredging and are generally sufficiently deep and wide to handle OCS oil- and gas-related traffic (refer to Table 3-7 of the CPA 235/241/247 Supplemental EIS for the CPA proposed action). BOEM projects that no new navigation channels will be authorized and constructed during the years 2012-2051 as a direct result of the OCS Program.

3.1.2.2. Discharges and Wastes

Chapter 3.1.2.2 of the 2012-2017 WPA/CPA Multisale EIS describes in detail coastal discharges and wastes, and Chapter 3.1.2.2 of the WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS provide a summary and update to coastal discharges and wastes for a CPA proposed action. Information covered includes the following:

- disposal and storage for offshore operational wastes;
- onshore facility discharges;
- coastal service-vessel discharges;
- offshore wastes disposed onshore; and
- beach trash and debris.

The USEPA, through general permits issued by the USEPA Region with jurisdictional oversight, regulates all waste streams generated from offshore oil and gas activities. The USEPA Region 6 has jurisdiction over the CPA off the Louisiana coast. The USEPA Region 4 has jurisdiction over the eastern portion of the GOM, including part of the CPA off the coasts of Alabama and Mississippi. Each region has promulgated general permits for discharges that incorporate the 1993 effluent guidelines as a minimum. In some instances, a site-specific permit is required. The USEPA also regulates vessel discharges with the Vessel General Permit (VGP), which is a Clean Water Act NPDES permit that authorizes, on a nationwide basis, discharges incidental to the normal operation of nonmilitary and nonrecreational vessels greater than or equal to 79 ft (24 m) in length. On March 28, 2013, the USEPA reissued the 2008 VGP for another 5 years; the reissued permit, the 2013 VGP, now contains numeric ballast water discharge limits for most vessels. The VGP also contains more stringent effluent limits for oil-to-sea interfaces and exhaust gas scrubber washwater (USEPA, 2013). The VGP, geographically, covers inland waters out to 3 mi (5 km) and applies to vessels acting as a means of transportation. If the vessel is moored to a rig generating an amount of water that is greater than what it takes for the normal operation of a vessel, the VGP would not apply to brine production. As of early March 2015, a bipartisan effort to establish a uniform national framework for the regulation of vessel discharges took another step forward as the Senate Committee on Commerce, Science and Transportation approved Senate Bill 373, the Vessel Incidental Discharge Act. If successful, the measure would replace a patchwork of

overlapping and conflicting Federal and State regulations with a uniform Federal framework for vessel discharge regulation (MarineLog, 2015).

The BSEE policy regarding marine debris prevention is outlined in NTL 2015-BSEE-G03, "Marine Trash and Debris Awareness and Elimination." The NTL instructs OCS operators to post informational placards that outline the legal consequences and potential ecological harms of discharging marine debris. The NTL also states that OCS workers should complete annual marine debris prevention training and instructs operators to develop a certification process for the completion of this training by their workers. These various laws, regulations, and the aforementioned NTL will likely minimize the discharge of marine debris from OCS operations.

For the CPA proposed action, existing onshore facilities would continue to be used to dispose of wastes generated offshore. However, no new disposal facilities are expected to be licensed as a direct result of the CPA proposed action. There is no current expectation for new onshore waste disposal facilities to be authorized and constructed during the 2012-2051 period as a direct result of the OCS Program. If needed, existing facilities may undergo expansion, but no new disposal facilities are expected.

3.2. IMPACT-PRODUCING FACTORS AND SCENARIO—ACCIDENTAL EVENTS

3.2.1. Oil Spills

Oil-spill occurrence cannot be predicted, but an estimate of its likelihood can be quantified using spill rates derived from historical data and projected volumes of oil produced and transported. The following chapters discuss spill prevention and spill response, and analyze the risk of spills that could occur as a result of activities associated with the CPA proposed action. Public input through public scoping meetings, Federal and State agencies' input through consultation and coordination, and industry and nongovernmental organizations' input indicate that oil spills are perceived to be a major concern. The following chapters analyze the risk of spills that could occur as a result of a typical CPA proposed action, as well as information on the number and sizes of spills from non-OCS sources. Since the potential occurrence of a catastrophic spill is exceedingly low (Ji et al., 2014), it is not expected as a result of a CPA proposed action. However, it cannot be ruled out entirely; refer to **Appendix B** for the "Catastrophic Spill Event Analysis."

3.2.1.1. Spill Prevention

Over the years, comprehensive pollution-prevention requirements that include redundant safety systems, as well as inspection and testing requirements to confirm that these devices are working properly, have been established (**Chapter 1.5**). During the 40 years before the *Deepwater Horizon* oil spill, an overall reduction in spill volume had occurred, while oil production generally increased. A characterization of spill rates and the average and median volumes from 1995 to 2009 compared with 1996 to 2010, which includes the *Deepwater Horizon* oil spill, is provided in *Update of Occurrence Rates for Offshore Oil Spills* (Anderson et al., 2012). BOEM attributes this improvement to BSEE and predecessor agencies operational requirements, ongoing efforts by the oil and gas industry to enhance safety and pollution prevention, and the evolution and improvement of offshore technology.

3.2.1.2. Past OCS Spills

The BSEE spill-event database includes records of past spills from activities that are regulated by BOEM and BSEE. These data include oil spills >1 bbl that occurred in Federal waters from OCS facilities and pipeline operations. Spills from facilities include spills from drilling rigs, drillships, and storage, processing, or production platforms that occurred during OCS drilling, development, and production operations. Spills from pipeline operations are those that have occurred on the OCS and are directly attributable to the transportation of OCS oil. Anderson et al. (2012) was utilized in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS for a CPA proposed action to characterize spill rates and to provide analysis for average and median volumes. The analysis by Anderson et al. (2012) examined spill data for the period 1964 to 2010, including the *Deepwater Horizon* oil spill.

A search of BSEE's oil-spill database (USDOI, BSEE, 2015a) was performed to assess new spill information to provide an update to the Anderson et al. (2012) analysis. The most recent data available provide additional information for the period 2011 to 2013, during which 46 spills from OCS oil- and gas-related activities between 1 and 1,000 bbl in size were reported from OCS platforms and pipelines. The breakdown of the 46 spills between 1 and 1,000 bbl that occurred from 2011 to 2013 from OCS oil- and gas-related activities is as follows: 28 spills of 1-4 bbl; 6 spills of 5-9 bbl; 10 spills of 10-49 bbl; 1 spill of 50-99 bbl; 1 spill of 100-999 bbl; and 0 spills of ≥1,000 bbl. The combined total of oil spilled in these 46 events was 857 bbl. The BSEE database (USDOI, BSEE, 2015b) indicated that there were two spills (one in 2011 and one in 2012) that were between 50 and 500 bbl in size, both of which occurred in the CPA. The spill of 67 bbl in 2011 was the result of equipment failure from a platform leak located in Garden Banks Block 72. The spill in 2012 was estimated at 480 bbl and resulted from an explosion on a platform located in West Delta Block 32. In summary, two spills >50 bbl occurred during the period 2011 to 2013. This is an outcome that is within the range of spills estimated to occur in Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS, which provides an estimate of the number and size of spills likely to occur as a result of the CPA proposed action over a 40-year time period. Thus, the additional information provided by the review of BSEE's oil-spill database did not change the validity of the scenario previously presented.

The majority of the 2011-2013 spills are attributed to OCS oil- and gas-related platforms/rigs, followed by vessels, and lastly by OCS oil- and gas related pipelines. These data were compared with the estimated number and size of spills presented in Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS and it was found that the new spill data were within the spill numbers estimated in the prior 2012-2017 Gulf of Mexico EISs. The new data also supported the previous finding that the most likely source of a spill would be from platforms, rigs, or vessels. Thus, a review of recent information does not change the risk analyses for spills <1,000 bbl previously provided in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

On May 12, 2016, the USCG responded to an offshore oil spill that reportedly discharged from a Shell subsea well-head flow line approximately 90 mi ((145 km) south of Timbalier Island, Louisiana, in Green Canyon Block 248. The volume of the release was estimated at 2,100 bbl. Response efforts included on-water recovery vessels and skimming operations. There were no reported impacts to wildlife or shorelines. This information is preliminary and BSEE's personnel are leading an investigation to determine the cause of the release.

3.2.1.3. Characteristics of OCS Oil

The physical and chemical properties of oil greatly affect its transport and ultimate fate in the environment and determine the following: how oil will behave on the water surface (surface spills) or in the water column and sediments (subsea spills); the persistence of the slick on the water; the type and speed of weathering processes; the degree and mechanisms of toxicity; the effectiveness of containment and recovery equipment; and the ultimate fate of the spill residues. Crude oils are a natural mixture of hundreds of different compounds, with liquid hydrocarbons accounting for up to 98 percent of the total composition. The chemical composition of crude oil can vary significantly from different producing areas; thus, the exact composition of oil being produced in OCS waters varies throughout the Gulf. The American Petroleum Institute gravity (API gravity) is a measure of the relative density of oil compared with water and is expressed in degrees (°). Oils with an API gravity <10 are heavier and typically sink, whereas oils with an API gravity >10 are lighter and typically float. Following an oil spill, the composition of the released oil can change substantially due to weathering processes such as evaporation, emulsification, dissolution, and oxidation. More details on the properties and persistence of different types of oils are provided in Table 3-8 of the CPA 241/247 and EPA 226 Supplemental EIS.

Extensive laboratory testing has been performed on various oils from the GOM to determine their physical and chemical characteristics. For example, numerous oils collected from the GOM (U.S. waters) are included in Environment Canada's (2013) oil properties database. The database provides details of an oil's chemical composition including hydrocarbon groups (i.e., saturates, aromatics, resins, and asphaltenes), VOCs (such as benzene, toluene, ethylbenzene, and xylene), sulfur content, biomarkers, and metals. The database also includes API gravities, of which GOM oils are in the range, of 15° to 60°. Additional data have been collected from approximately 450 deepwater exploration plans (EP) and

DOCDs that were submitted to BOEM/BSEE. These data are available through BOEM's Exploration and Development Plans Online Query (refer to USDOI, BOEM, 2014b). Statistics on these API gravities result in a similar range (16° to 58°) as previously reported, with a mean value of 36°. These new data corroborate the information previously presented in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

3.2.1.4. Overview of Spill Risk Analysis

There are many factors that BOEM evaluates to determine the risk of impact occurring from an oil spill, including likely spill sources, likely spill locations, likely spill sizes, the likelihood and frequency of occurrence for different size spills, timeframes for the persistence of spilled oil, volumes of oil removed due to weathering and cleanup, and the likelihood of transport by wind and waves resulting in contact to specified environmental features. Sensitivity of the environmental resources and potential effects are addressed in the analyses for the specific resources of concern (**Chapter 4.1.1**). BOEM uses data on past OCS production and spills, along with estimates of future production, to evaluate the risk of future spills. Additionally, BOEM uses a numerical model to calculate the likely trajectory of spills (i.e., transport pathways) and analyzes historical data of occurrence rates for oil spills (refer to Anderson et al., 2012) to make projections of future oil-spill frequency and size. A more detailed description of the spill risk analysis and the trajectory model, called OSRA (oil-spill risk analysis) model, were provided in Chapter 3 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS as well as in the Ji et al. (2012) OSRA report. Appendix C of the CPA 235/241/247 Supplemental EIS also contains the OSRA model's catastrophic spill event results to estimate the risks associated with a possible future low-probability catastrophic or high-volume, long-duration oil spill.

The OSRA model's results and estimated spill size/frequency tables as presented and discussed in the 2012-2017 WPA/CPA Multisale EIS remain applicable because the basic assumptions inherent in the model and calculations are still valid. The latest analysis available for the characterization of spill rates and for average and median volumes (Anderson et al., 2012) inputted into the model is still valid because the more recent small OCS spills (2011-2013) were within spill scenario estimates developed using the past data. In addition, the physical forcing (e.g., ocean currents and wind fields) and environmental resources input (e.g., locations and seasonality of various biological resources) to the OSRA model are still representative of our current state of knowledge regarding both ocean modeling and potential environmental resources at risk. Numerous efforts are underway since the *Deepwater Horizon* oil spill to further improve trajectory modeling in the Gulf of Mexico, including several BOEM environmental studies (e.g., refer to Section 4.2 in Ji et al., 2013). However, the results of these new research activities are not yet available or fully tested for incorporation into BOEM's oil-spill risk analysis. Thus, new information did not change the results of previous spill risk analyses provided in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

The following discussions provide risk information for offshore and coastal spills that may result from the CPA proposed action. This analysis is divided into discussions of offshore spills ≥1,000 bbl, offshore spills <1,000 bbl, and coastal spills of any spill volume. Only spills ≥1,000 bbl are addressed using OSRA because smaller spills typically do not persist long enough to be simulated by trajectory modeling.

3.2.1.5. Risk Analysis for Offshore Spills ≥1,000 bbl

Chapter 3.2.1.5 of the 2012-2017 WPA/CPA Multisale EIS addressed the risk of spills ≥1,000 bbl that could occur from accidents associated with activities resulting from a CPA proposed action. The risk analyses included the following:

- estimated number of offshore spills ≥1,000 bbl and probability of occurrence;
- most likely source of offshore spills ≥1,000 bbl;
- most likely size of an offshore spill ≥1,000 bbl;

- fate of offshore spills ≥1,000 bbl;
- transport of spills ≥1,000 bbl by winds and currents;
- length of coastline affected by offshore spills ≥1,000 bbl; and
- likelihood of an offshore spill ≥1,000 bbl occurring and contacting modeled locations of environmental resources.

Specifically, Table 3-19 of the 2012-2017 WPA/CPA Multisale EIS estimated that the mean number of spills ≥1,000 bbl was ≤1 spill (mean equal to 0.5-1.0) from both OCS oil- and gas-related platforms and pipelines. Although the May 12, 2016, spill incident reported above exceeds the 1,000 bbl volume, the use of Anderson et al. (2012) remains applicable and up-to-date for characterizing spill rates and average and median spill volumes in this Supplemental EIS as this is the only spill in this size class to occur during the analysis for the 2012-2017 WPA/CPA Multisale EIS.

In terms of weathering, fate, and transport of oil spills in the Gulf of Mexico, a variety of ongoing studies are providing more insights in the aftermath of the *Deepwater Horizon* oil spill. For example, recent studies have provided further evidence that the diverse microbial communities in both the water column (e.g., Mason et al., 2012) and sediments (Kimes et al., 2013) of the GOM can play an active role in metabolizing and bioremediating crude oil from offshore spills. Further research is also being conducted regarding what impact chemical dispersant application may have on this biodegradation process. Other research on oil fates suggests that marine snow formation in the aftermath of a large oil-spill event (such as the *Deepwater Horizon* oil spill) may play a key role in the fate of surface oil (e.g., Passow et al., 2012).A review of recent information does not change the quantitative risk analyses for spills ≥1,000 bbl previously provided in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

3.2.1.6. Risk Analysis for Offshore Spills <1,000 bbl

Chapter 3.2.1.6 of the 2012-2017 WPA/CPA Multisale EIS addressed the risk of spills <1,000 bbl resulting from a CPA proposed action. Analysis of historical data shows that most offshore OCS oil spills fall within this category, with the majority of spills falling within the significantly smaller range of ≤1 bbl (Anderson et al., 2012). Although spills of ≤1 bbl amount to 96 percent of all OCS oil- and gas-related spill occurrences, they have contributed very little to the total volume of oil spilled. The risk analyses addressed in Chapter 3.2.1.6 of the 2012-2017 WPA/CPA Multisale EIS for a CPA proposed action included the following:

- estimated number of offshore spills <1,000 bbl and total volume of oil spilled;
- most likely source and type of offshore spills <1,000 bbl;
- most likely size of offshore spills <1,000 bbl;
- persistence, spreading, and weathering of offshore oil spills <1,000 bbl;
- transport of spills <1,000 bbl by winds and currents; and
- likelihood of an offshore spill <1,000 bbl occurring and contacting modeled locations of environmental resources.

A search of BSEE's oil-spill database (USDOI, BSEE, 2015a) was performed to assess new spill information that was not analyzed in Anderson et al. (2012). During 2011-2013, there were 46 spills from OCS oil- and gas-related activities of <1,000 bbl in size, totaling 857 bbl overall. The breakdown of these spills into size classes is provided in **Chapter 3.2.1.2**. As noted above, the 2011-2013 spill data were compared with the estimated number and sizes of spills presented in Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS and they were found to be within the spill numbers estimated in the previous documents. The new data also supported previous findings that the most likely source of a spill of <1,000 bbl would be from platforms, rigs, or vessels. Thus, a review of recent information does not

change the risk analyses for spills <1,000 bbl previously provided in Chapter 3.2.1.6 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

3.2.1.7. Risk Analysis for Coastal Spills

Spills in coastal waters could occur at storage or processing facilities supporting the OCS oil and gas industry or from the transportation of OCS-produced oil through State offshore waters and along navigation channels, rivers, and through coastal bays. BOEM projects that almost all (>99%) oil produced as a result of a CPA proposed action will be brought ashore via pipelines to oil pipeline shore bases, stored at these facilities, and eventually transferred via pipeline or barge to Gulf coastal refineries. Because oil is commingled at shore bases and cannot be directly attributed to a particular lease sale, this analysis of coastal spills addresses spills that could occur prior to the oil arriving at the initial shoreline facility. It is also possible that non-OCS oil may be commingled with OCS oil at these facilities or during subsequent secondary transport. Chapter 3.2.1.7 of the 2012-2017 WPA/CPA Multisale EIS describes in detail the estimated number and most likely sizes of coastal spills and the likelihood of coastal spill contact.

The number and most likely spill sizes to occur in coastal waters in the future are expected to resemble the patterns that have occurred in the past, as long as the level of hydrocarbon use by commercial and recreational activities remains generally the same. Estimates of future coastal spills are based on the number and location of historical coastal spills reported to USCG. Based on the USCG's historical data for the GOM region, Louisiana and Texas are attributed the highest probability of having a spill ≥1,000 bbl occur in coastal waters.

3.2.1.8. Risk Analysis by Resource

BOEM previously analyzed the risk to resources from oil spills and oil slicks that could occur as a result of a CPA proposed action in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS. The risk results were based on BOEM's estimates of likely spill locations, sources, sizes, frequency of occurrence, physical fates of different types of oil slicks, and probable transport that were described in more detail in specific spill scenarios. For offshore spills ≥1,000 bbl, combined probabilities were calculated using the OSRA model, which includes both the likelihood of a spill from the CPA proposed action occurring and the likelihood of the oil slick reaching areas where known environmental resources exist. The analysis of the likelihood of direct exposure and interaction of a resource with an oil slick and the sensitivity of a resource to the oil is provided under each resource category in Chapter 4.1.1 of this Supplemental EIS and was provided in Chapter 4.1.2 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS, and Chapter 3.2.1.8 and Figures 3-8 through 3-28 of the 2012-2017 WPA/CPA Multisale EIS.

3.2.1.9. Spill Response

For a CPA proposed action, Chapter 3.2.1.9 of the 2012-2017 WPA/CPA Multisale EIS describes in detail issues related to offshore spill-response requirements and initiatives; offshore response, containment, and cleanup technology; and onshore response and cleanup. Additional information and updates to the 2012-2017 WPA/CPA Multisale EIS have been included within respective sections of the WPA 233/CPA 231 Supplemental EIS, WPA 233/ CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

As a result of the Oil Pollution Act of 1990 and the reorganization of the Bureau of Ocean Energy Management, Regulation and Enforcement into BOEM and BSEE in 2010, BSEE was tasked with a number of oil-spill response duties and planning requirements. The BSEE implements the following requirements according to BSEE's regulations at 30 CFR parts 250 and 254:

- conducts investigations to determine the cause of a spill;
- assesses civil and criminal penalties, if needed;

- sets requirements and reviews and approves oil spill response plans (OSRPs) for offshore facilities;
- conducts unannounced drills to ensure compliance with OSRPs;
- requires operators to ensure that their spill-response operating and management teams receive appropriate spill-response training;
- conducts inspections of oil-spill response equipment;
- requires industry to show financial responsibility to respond to possible spills; and
- provides research leadership to improve the capabilities for detecting and responding to an oil spill in the marine environment.

BOEM also has regulatory requirements addressing site-specific OSRPs and spill response information. In accordance with BOEM's regulations at 30 CFR §§ 550.219 and 550.250, operators must have an approved OSRP prior to BOEM's approval of an operator-submitted exploration, development, or production plan. Operators are, therefore, required to provide BOEM an OSRP that is prepared in accordance with 30 CFR part 254 subpart B with their proposed exploration, development, or production plan for the facilities that they will use to conduct their activities; or to alternatively reference their approved regional OSRP by providing the following information:

- a discussion of the approved OSRP;
- the location of the primary oil-spill equipment base and staging area;
- the name of the oil-spill equipment removal organization(s) for both equipment and personnel;
- the calculated volume of a facility's worst-case discharge scenario in accordance with 30 CFR § 254.26(a) and a comparison of the worst-case discharge scenario in the approved regional OSRP with the worst-case discharge calculated for these proposed activities;
- a description of the worst-case discharge scenario to include the trajectory information, potentially impacted resources, and a detailed discussion of the spill response proposed to the worst-case discharge in accordance with 30 CFR §§ 254.23(b)-(d); and
- a description of the response equipment, personnel, and support equipment to be called out and the time required for the equipment to be procured, transported, and deployed at a spill site.

All OSRPs are reviewed and approved by BSEE, whether submitted with a BOEM-associated plan or directly to BSEE in accordance with 30 CFR part 254. Hence, BOEM relies heavily upon BSEE's expertise to ensure that the OSRP complies with all pertinent laws and regulations, and demonstrates the ability of an operator to respond to a worst-case discharge. The operator is also required to carry out the training, equipment testing, and periodic drills described in the OSRP. Since 1989, BSEE and its predecessor agencies have conducted government-initiated unannounced exercises that provide an economically feasible mechanism for agencies to comply with the requirements defined in 30 CFR part 254. In 2014, BSEE carried out seven table-top, government-initiated unannounced exercises and two deployment government-initiated unannounced exercises (USDOI, BSEE, 2014a). Equipment deployment exercises most often take place in waterways adjacent to where the equipment is stored, but they may be moved if the exercise requires it. Typical deployment exercises last only a few hours and rarely longer than a day (USDOI, BSEE, official communication, 2015c). The NTLs and guidance documents issued by BOEM and BSEE prior to 2012 that clarify additional oil-spill requirements since the *Deepwater Horizon* explosion, oil spill, and response occurred are described in detail in Chapter 3.2.1.9 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

The NTL 2012-BSEE-N06, "Guidance to Owners and Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans," which was effective on August 10, 2012, provides clarification, guidance, and information concerning the preparation and submittal of a regional OSRP for owners and operators of oil handling, storage, or transportation facilities, including pipelines located seaward of the coastline. Some of the clarifications and encouraged practices that are identified in NTL 2012-BSEE-N06 and that are based upon lessons learned from the *Deepwater Horizon* oil-spill response are described in detail in the CPA 241/247 and EPA 226 Supplemental EIS.

The BSEE has also issued NTL 2013-BSEE-N02, "Significant Change to Oil Spill Response Plan Worst Case Discharge Scenario" to clarify what BSEE considers a significant change in a worst-case discharge scenario, which requires that a revision to an OSRP be submitted. Details of the guidance issued by this NTL are discussed in the CPA 241/247 and EPA 226 Supplemental EIS.

The BSEE also issued NTL 2012-BSEE-N07, "Oil Discharge Written Follow-up Reports," to address the oil discharge reports (30 CFR § 254.46(b)(2)) that are required to be submitted by a responsible party to BSEE for spills ≥1 bbl within 15 days after a spill has been stopped or ceased. The responsible party is encouraged to report cause, location, volume, remedial action taken, sea state, meteorological conditions, and the size and appearance of the slick.

Mechanical Cleanup

As previously indicated, BSEE oversees a research program to improve the capabilities for detecting and responding to an oil spill in the marine environment. One of BSEE's recently completed research projects suggested an alternative to improve the present regulatory requirements at 30 CFR § 254.44 for determining the effective daily recovery capacity of spill-response skimming equipment. The suggested alternative considers the encounter rate of a skimming system with spilled oil as a measure of effective daily recovery capacity instead of the presently used de-rated pump capacity of a skimmer. This project was undertaken because the *Deepwater Horizon* oil-spill response highlighted that the existing regulation may not be an effective or accurate planning standard or a predictor of oil-spill response equipment recovery capacity. The project was completed in 2012 and the National Academy of Sciences completed a peer review in 2013. The BSEE's Gulf of Mexico OCS Region is presently using the results of this study in its OSRP reviews.

There have been some changes to the spill-response equipment staging locations previously reported in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, and CPA 235/241/247 Supplemental EIS. Due to these changes, it is expected that the oil-spill response equipment needed to respond to an offshore spill in a proposed lease sale area could be called out from one or more of the following oil-spill equipment base locations: New Iberia, Belle Chasse, Baton Rouge, Sulphur, Morgan City, Port Fourchon, Harvey, Houma, Galliano, Leeville, Fort Jackson, Venice, Grand Isle, or Lake Charles, Louisiana;, Corpus Christi, Port Arthur, Aransas Pass, Ingleside, Galveston, or Houston, Texas; Pascagoula or Kiln, Mississippi; Mobile or Bayou La Batre, Alabama; and/or Panama City, Pensacola, Tampa, and/or Miami, Florida (Clean Gulf Associates, 2015; Marine Spill Response Corporation, 2015; National Response Corporation, 2015).

Dispersants

The USEPA has recently issued a proposed rule to amend the requirements in Subpart J of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) that governs the use of dispersants, other chemical and biological agents, and other spill mitigating substances when responding to oil discharges into waters of the United States. The proposal addresses the efficacy, toxicity, environmental monitoring of dispersants, and other chemical and biological agents, as well as public, local, State, and Federal officials' concerns regarding their use (*Federal Register*, 2015b). The USEPA also updated the NCP product schedule in 2014. The 2014 NCP Product Schedule authorizes dispersants, surface washing agents, surface collecting agents, bioremediation agents, and miscellaneous oil-spill control agents for use on oil discharges.

In February 2014, the USEPA published an NCP Product Schedule Notebook that presents manufacturers' summary information that describes (1) the conditions under which each of the products is recommended for use, (2) handling and worker precautions, (3) storage information, (4) recommended

application procedures, (5) physical properties, (6) toxicity information, and (7) effectiveness information (USEPA, 2014).

Due to the unprecedented volume of dispersants applied for an extended period of time in situations not previously envisioned or incorporated in existing dispersant use plans during the *Deepwater Horizon* oil-spill response, the U.S. National Response Team has developed guidance for monitoring atypical dispersant operations. The guidance document, which was approved on May 30, 2013, is titled *Environmental Monitoring for Atypical Dispersant Operations: Including Guidance for Subsea Application and Prolonged Surface Application*. The subsea guidance generally applies to the subsurface ocean environment and focuses on operations in waters below 300 m (984 ft) and below the pycnocline (or below the subsea layer where the density gradient is the greatest). The surface application guidance supplements and complements the existing protocols as outlined within the existing Special Monitoring of Applied Response Technologies (SMART) monitoring program where the duration of the application of dispersants on discharged oil extends beyond 96 hours from the time of the first application (U.S. National Response Team, 2013). This guidance is provided to the Regional Response Teams by the U.S. National Response Team to enhance existing SMART protocols and to ensure that their planning and response activities will be consistent with national policy.

Shoreline Cleanup Countermeasures

In addition, the USCG improved coastal oil-spill response since the *Deepwater Horizon* oil spill by replacing the One Gulf Plan with separate Area Contingency Plans (ACPs) for each coastal USCG sector. The ACPs cover sub-regional geographic areas and represent the third tier of the National Response Planning System mandated by the Oil Pollution Act of 1990. The ACPs are a focal point of response planning. The Gulf of Mexico OCS Region's ACPs also include separate Geographic Response Plans, which are developed jointly with local, State, and other Federal entities to better focus spill-response tactics and priorities. These Geographic Response Plans, which will be periodically revisited, contain the resources initially identified for protection during a spill, response priorities, procedures, and appropriate spill-response countermeasures.

3.2.2. Losses of Well Control

In 2012, BSEE published the Drilling Safety Rule, which addressed some key recommendations made after the *Deepwater Horizon* explosion, oil spill, and response. This rule was updated on April 29, 2016, when BSEE published the updated final Drilling Safety Rule (*Federal Register*, 2016a). The 2012 Proposed Rule implemented certain recommended safety measures by incorporating the recommendations contained in the DOI report *Increased Safety Measures for Energy Development on the Outer Continental Shelf* (Safety Measures Report; USDOI, 2010). In 2012, the BSEE proposed amending the drilling, well-completion, well-workover, and decommissioning regulations related to well control, including subsea and surface blowout preventers, well casing and cementing, secondary intervention, unplanned disconnects, recordkeeping, and well plugging. The 2012 Proposed Rule also enhanced the description and classification of well-control barriers, defined testing requirements for cement, clarified requirements for the installation of dual mechanical barriers, and extended requirements for blowout preventers (BOPs) and well-control fluids to well-completions, workovers, and decommissioning operations. The 2016 Final Rule closed the gaps in existing requirements, addresses additional *Deepwater Horizon* recommendations, and updates BSEE's regulations to reflect industry's best practices. The 2016 Final Rule is a comprehensive regulation addressing all dimensions of well control, including more stringent design requirements and operational procedures for critical well-control equipment used in oil and gas operations on the United States' OCS.

Specifically, the 2016 Final Rule addresses the full range of systems and equipment related to well-control operations, with a focus on blowout preventer requirements, well design, well-control casing, cementing, real-time monitoring, and subsea containment. The measures are designed to improve equipment reliability, especially for blowout preventers and blowout prevention technologies. The 2016 Final Rule requires operability of equipment through rigorous testing and provides for the continuous oversight of operations. The regulations combine prescriptive and performance-based measures. Key features of the 2016 Final Rule include requirements for blowout preventer systems, double shear rams, third-party reviews of equipment, real-time monitoring data, safe drilling margins, centralizers, inspection

intervals, and other reforms related to well design and control, casing, cementing, and subsea containment.

The 2012 Proposed Rule was based upon significant input received from various investigations and reports of the *Deepwater Horizon* explosion, oil spill, and response and include the Bureau of Ocean Energy Management, Regulation and Enforcement/U.S. Coast Guard's *Report Regarding the Causes of the April 20, 2010, Macondo Well Blowout* (USDOI, BOEMRE, 2011); *Macondo Well* Deepwater Horizon *Blowout: Lessons for Improving Offshore Drilling Safety* (Committee for Analysis of Causes of the *Deepwater Horizon* Explosion, Fire, and Oil Spill to Identify Measure to Prevent Similar Accidents to the Future et al., 2011); *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling; Report to the President* (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011); *Final Summary Report: April 2011-January 2013* (Ocean Energy Safety Advisory Committee, 2013); and extensive external consultation. Most of the 2016 Final Rule requirements do not become effective until 3 months after publication of the 2016 Final Rule, and several requirements have more extended timeframes for compliance.

All losses of well control must be reported to the BSEE. Pursuant to 30 CFR § 250.188 (a)(3), a loss of well-control incident must immediately be orally reported to the BSEE. Operators are required to report any loss of well-control event, even if temporary, and the cause of the event. The operator does not have to provide information on kicks that were controlled, but the operator should include the release of fluids through a flow diverter (a conduit used to direct fluid flowing from a well away from the drilling rig).

The current definition for loss of well control is as follows:

- uncontrolled flow of formation or other fluids (the flow may be to an exposed formation [an underground blowout] or at the surface [a surface blowout]);
- uncontrolled flow through a diverter; and/or
- uncontrolled flow resulting from a failure of surface equipment or procedures.

A loss of well control can occur during any phase of development, i.e., exploratory drilling, development drilling, well completion, production, or workover operations. From 2007 to 2014, of the 47 loss of well-control events reported in the GOM, 25 (53%) resulted in loss of fluids at the surface or underground (USDOI, BSEE, 2015b). In addition to spills, the loss of well control can resuspend and disperse bottom sediments. Historically, since 1971, most OCS blowouts have resulted in the release of gas, while blowouts resulting in the release of oil have been rare.

A BOP is a device with a complex of choke lines and hydraulic rams mounted atop a wellhead designed to close the wellbore with a sharp horizontal motion that may cut through or pinch shut casing and sever tool strings. The BOPs were invented in the early 1920's and have been instrumental in ending dangerous, costly, and environmentally damaging oil blowouts on land and in water. The BOPs have been required for OCS oil and gas operations from the time offshore drilling began in the late 1940's.

The BOPs are actuated as a last resort upon imminent threat to the integrity of the well or the surface rig. For a cased well, which is the typical well configuration, the hydraulic ram of a BOP may be closed if oil or gas from an underground zone enters the wellbore to destabilize the well. By closing a BOP, usually by redundant surface-operated and hydraulic actuators, the drilling crew can prevent explosive pressure release and allow control of the well to be regained by balancing the pressure exerted by a column of drilling mud with formation fluids or gases from below. Chapter 3.2.1.9.2 of the 2012-2017 WPA/CPA Multisale EIS provides information on the subsea well containment capability staged in the GOM area that could be used by an offshore operator if a loss of well control occurred and resulted in a loss of fluids.

3.2.3. Pipeline Failures

The potential mechanisms for damage to OCS pipeline infrastructure include mass sediment movements and mudslides that can exhume or push the pipelines into another location, impacts from anchor drops or boat collisions, and accidental excavation or breaching because the exact whereabouts of a pipeline are uncertain. Pipeline failures could be caused by rig/platform and pipeline activities supporting a CPA proposed action. Chapter 3.2.3 of the 2012-2017 WPA/CPA Multisale EIS describes

previous incidents of OCS oil- and gas-related pipeline failures related to a CPA proposed action. Any one of the mechanisms listed above could cause an OCS oil- and gas-related oil spill ≥1,000 bbl. Any resulting spill size would be limited by the size of the pipeline and the ability of an operator to quickly shut off flow from the source. The median spill size estimated from a pipeline failure is 2,200 bbl (Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS). For a CPA proposed action, up to one spill of this size is estimated to occur during the 40-year analysis period.

3.2.4. Vessel Collisions

The MMS (now BOEM and BSEE) revised vessel operator incident reporting requirements in a final rule effective July 17, 2006 (*Federal Register*, 2006). The incident reporting rule more clearly defines what incidents must be reported, broadens the scope to include incidents that have the potential to be serious, and requires the reporting of standard information for both oral and written reports. As part of the incident reporting rule, BSEE's regulations at 30 CFR § 250.188(a)(6) require an operator to report all collisions that result in property or equipment damage greater than $25,000. "Collision" is defined as the act of a moving vessel (including an aircraft) striking another vessel or striking a stationary vessel or object (e.g., a boat striking a drilling rig or platform). Chapter 3.2.3 of the 2012-2017 WPA/CPA Multisale EIS provides data related to vessel collisions and discusses methods of prevention and avoidance of vessel collisions related to a CPA proposed action.

3.2.5. Chemical and Drilling-Fluid Spills

Chapter 3.2.5 of the 2012-2017 WPA/CPA Multisale EIS describes OCS oil- and gas-related chemical and synthetic-based fluid spills. Below is a brief summary of that information.

Chemicals are stored and used to condition drilling muds during exploration and development and in well completions, stimulation, and workover procedures. The most common chemicals spilled are methanol, ethylene glycol, and zinc bromide. Methanol and ethylene glycol may be used as a treatment to prevent the formation of gas hydrates while zinc bromide may be used in completion fluids. Completion fluids are used in the largest quantity and constitute the largest volume of accidental releases. Completion fluids consist of brines made from seawater mixed with calcium chloride, calcium bromide, and/or zinc bromide. A study of chemical spills from OCS oil- and gas-related activities determined that only two chemicals could potentially impact the marine environment—zinc bromide and ammonium chloride (Boehm et al., 2001). Both of these chemicals are used for well treatment or completion and, therefore, are not in continuous use. Most other chemicals are either nontoxic or used in small quantities. There are some differences in the operational needs for chemicals in deepwater versus shallow-water operations. Higher volumes of treatment chemicals (e.g., defoamers and hydrate inhibitors) are used in deepwater environments due to the conditions encountered there (Boehm et al., 2001).

Synthetic-based fluids (SBFs) or synthetic-based muds have been used since the mid-1990's. In deepwater drilling, SBFs are preferred over water-based muds because of the SBFs' superior performance properties. The synthetic oils used in SBFs are relatively nontoxic to the marine environment and have the potential to biodegrade. However, it should be noted that SBFs are not permitted to be discharged into the marine environment; only cuttings wetted with SBF may be discharged after the majority of synthetic fluid has been removed. Additionally, accidental riser disconnects could result in the release of large quantities of drilling fluids and are of particular concern when SBFs are in use. For further discussion on this topic, refer to Chapter 3.1.1.4.1 of the 2012-2017 WPA/CPA Multisale EIS. Refer to Chapter 3.2.5 of the CPA 235/241/247 Supplemental EIS for the most recent information on BSEE's counts and summaries for spills ≥50 bbl.

3.3. CUMULATIVE ACTIVITIES SCENARIO

The preceding sections of **Chapter 3** discuss the impact-producing factors and scenario for routine activities and accidental events associated with a CPA that could potentially impact the physical, environmental, and socioeconomic resources that are analyzed in this Supplemental EIS. This chapter presents a summary of other factors that may cumulatively impact those resources. For a more complete and detailed discussion of topics related to cumulative activities related to a CPA proposed action, refer to Chapter 3.3 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA

235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS, which are hereby incorporated by reference.

3.3.1. OCS Program

The OCS Program's cumulative scenario includes all activities that are projected to occur from past, proposed, and future lease sales during the 40-year activity period. Projected reserve/resource production for the OCS Program (**Table 3-1**) is 18.34-25.64 BBO and 75.886-111.627 Tcf of gas. **Table 3-3** presents projections of the major activities and impact-producing factors related to future Gulfwide OCS Program activities.

The level of OCS oil- and gas-related activity is connected to oil prices, resource potential, cost of development, and rig availability rather than just the amount of acreage leased. The impacts of activities associated with the OCS Program on biological, physical, and socioeconomic resources are analyzed in the cumulative impacts analysis sections of **Chapter 4.1.1** of this Supplemental EIS, Chapter 4.2.1 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS.

Note that offshore and onshore impact-producing factors and scenarios associated with a WPA or an EPA proposed action (i.e., a typical lease sale that would result from a proposed action within the WPA or EPA), as well as OCS Program activity resulting from past and future lease sales in the WPA or EPA, are disclosed in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, WPA 238/246/248 Supplemental EIS, WPA 246/248 Supplemental EIS, EPA 225/226 EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

3.3.2. State Oil and Gas Activity

All five Gulf Coast States have had some historical oil and gas exploration activity and, with the exception of Florida and Mississippi, currently produce oil and gas in State waters. The coastal infrastructure that supports the OCS Program also supports State oil and gas activities.

State oil and gas infrastructure consists of the wells that extract hydrocarbon resources, facilities that produce and treat the raw product, pipelines that transport the product to refineries and gas facilities for further processing, and additional pipelines that transport finished product to points of storage and final consumption. The type and size of infrastructure that supports production depends upon the size, type, and location of the producing field, the time of development, and the life cycle stage of operations. Chapter 3.3.2 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS provides a reference for relevant historical information on State leasing programs for a CPA proposed action. The most recent lease sale information for Texas and Louisiana has been updated below.

Texas

The most recent State oil and gas lease sale occurred on January 20, 2015. Fifty-one parcels containing 24,850 ac (10,056 ha) of State lands were offered for oil and gas leasing in the offshore area (State of Texas, General Lands Office, 2015a). A total of eight bids were received on 4,400 ac (1,780 ha) (State of Texas, General Lands Office, 2015b). BOEM expects that Texas will conduct regular oil and gas lease sales during the 40-year cumulative activities scenario for OCS oil- and gas-related activity, although the lease sale's regularity could differ from current practices.

Louisiana

During the 2014 Fiscal Year, the State of Louisiana offered 37 tracts for lease offshore, 17 of which were awarded. BOEM expects that Louisiana will conduct regular oil and gas lease sales during the 40-year cumulative activities scenario for OCS oil- and gas-related activity, although the lease sale's regularity could differ from current practices (State of Louisiana, Dept. of Natural Resources, 2015).

Mississippi

Per conversations with the Mississippi Development Authority (2012), BOEM expects Mississippi to institute a lease sale program in the near future and to begin leasing in State waters during the 40-year cumulative activities scenario for OCS oil- and gas-related activity analyzed in this Supplemental EIS. Recent efforts to open Mississippi State waters for G&G and leasing activities have been challenged in court (Davis, 2014).

Alabama

Alabama has no established schedule of lease sales. The limited number of blocks in State waters has resulted in the State not holding regularly scheduled lease sales. The last lease sale was held in 1997. BOEM does not expect Alabama to institute a lease sale program in the near future, although there is at least a possibility of a lease sale in State waters during the 40-year cumulative activities scenario for OCS oil- and gas-related activity following a proposed action (Mobile Area Chamber of Commerce, 2011).

Florida

BOEM does not expect Florida to institute a lease sale program in the near future, although it is possible that a change in policy could lead to leasing on the OCS or in State waters during the 40-year cumulative activities scenario for OCS oil- and gas-related activity analyzed in this Supplemental EIS. For more information, refer to Chapter 3.3.2 of the 2012-2017 WPA/CPA Multisale EIS.

Pipeline Infrastructure

A mature pipeline network exists in the GOM to transport oil and gas produced on the OCS to shore (**Chapter 4.1.1.23.1** for a CPA proposed action). The network carries oil and gas onshore and inland to refineries and terminals, and a network of pipelines distributes finished products such as diesel fuel or gasoline to and between refineries and processing facilities onshore (Peele et al., 2002, Figure 4.1). Expansion of this network is projected to be primarily small-diameter pipelines to increase the interconnectivity of the existing network and a few major interstate pipeline expansions. Any new larger-diameter pipelines would likely be constructed to support onshore and offshore LNG terminals. Refer to Chapter 3.3.2 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS for information on pipeline infrastructure activities within the State waters of Texas, Louisiana, Mississippi, and Alabama in relation to a CPA proposed action.

Cumulative Activities Scenario: Over the next 40 years, increased use of OCS sand for Louisiana restoration projects is likely. Currently, no Texas restoration projects have been specifically identified. The boundary between the OCS and Texas State waters (9 nmi [10 mi; 16 km]) allows that some offshore sand is within the jurisdiction of the State; however, the easternmost portion of the shelf in Texas State waters is relatively devoid of beach-quality sand deposits. The Texas General Land Office, in cooperation with BOEM and the Texas Bureau of Economic Geology, has investigated the potential for use of Heald and Sabine Banks as borrow for beach restoration projects, but it has yet to identify specific projects. With respect to Louisiana, some uncertainty exists as to the amount of offshore OCS sand that will eventually be sought for coastal restoration projects. The Louisiana Coastal Area Ecosystem Restoration Plan potentially may use up to 60 million yd^3 (46 million m^3) (U.S. Dept. of the Army, COE, 2009). Recently, there has been an increase in requests from Louisiana for State-funded OCS sand resources projects. BOEM anticipates that this growing trend of State-led projects will continue into the future as restoration funding is made available directly to the State through the Coastal Impact Assistance Program, the Gulf of Mexico RESTORE Act, the *Deepwater Horizon* Natural Resource Damage Assessment (NRDA) restoration, and the Gulf of Mexico Energy Security Act.

3.3.3. Other Major Factors Influencing Offshore Environments

Other influencing factors occur in the offshore areas of the Gulf Coast States while OCS oil- and gas-related activity takes place at the same time. Some of these factors are (1) dredged material disposal, (2) OCS sand borrowing, (3) marine transportation, (4) military activities, (5) artificial reefs and

rigs-to-reefs development, (6) offshore LNG projects, (7) development of gas hydrates, and (8) renewable energy and alternative use.

Cumulative impacts to biological, physical, and socioeconomic resources from these types of non-OCS oil- and gas-related activities are analyzed in the cumulative impacts analysis sections in **Chapter 4.1.1** of this Supplemental EIS and Chapter 4.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

3.3.3.1. Dredged Material Disposal

Dredged material is described in 33 CFR part 324 as any material excavated or dredged from navigable waters of the United States. Materials from maintenance dredging are primarily disposed of offshore on existing dredged-material disposal areas and in ocean dredged-material disposal sites (ODMDS). Additional dredged-material disposal areas for maintenance or new-project dredging are developed as needed and must be evaluated and permitted by the U.S. Army Corps of Engineers (COE) and relevant State agencies prior to construction. ODMDS's are regulated by USEPA under the Clean Water Act and the Marine Protection, Research, and Sanctuaries Act (also called the Ocean Dumping Act).

If funds are available, COE uses dredge materials beneficially for restoring and creating habitat, for beach nourishment projects, and for industrial and commercial development (**Chapter 3.3.4.3**). The applicant will need funds to cover the excess cost over the least cost environmentally acceptable alternative (the Federal Standard). The material must also be suitable for the particular beneficial use. Virtually all ocean dumping that occurs today is maintenance dredging of sediments from the bottom of channels and bodies of water in order to maintain adequate channel depth for navigation and berthing. There are four authorized open-water disposal areas in Louisiana and Mississippi along stretches of the main Gulf Intracoastal Waterway (GIWW) between Louisiana and Mississippi: in Louisiana, Disposal Area 66 (1,593 ac; 645 ha); and in Mississippi, Disposal Area 65A (1,962 ac; 794 ha), Disposal Area 65B (815 ac; 330 ha), and Disposal Area 65C (176 ac; 71 ha) (U.S. Dept. of the Army, COE, 2008, Table 1). Dredged materials from the GIWW are sidecast at these locations. The ODMDS's utilized by COE are located in the cumulative activities area and include those shown in Table 3-30 of the 2012-2017 WPA/CPA Multisale EIS. Maps on the USEPA website show the locations for the ODMDS's in Louisiana and Texas (USEPA, 2011).

There are two primary Federal environmental statutes governing dredge material disposal. The Marine Protection, Research, and Sanctuaries Act (also called the Ocean Dumping Act) governs transportation for the purpose of disposal into ocean waters. Section 404 of the Clean Water Act governs the discharge of dredged or fill material into U.S. coastal and inland waters. The USEPA and COE are jointly responsible for the management and monitoring of ocean disposal sites. The responsibilities are divided as follows: (1) COE issues permits under the Clean Water Act and the Marine Protection, Research, and Sanctuaries Act; (2) USEPA has lead for establishing environmental guidelines/criteria that must be met to receive a permit under either statute; (3) permits for ODMDS disposal are subject to USEPA review and concurrence; and (4) USEPA is responsible for designating ODMDSs.

The COE's Ocean Disposal Database reports the amount of dredged material disposed in ODMDSs by district (U.S. Dept. of the Army, COE, 2010, Table 1). Table 3-9 of the CPA 235/241/247 Supplemental EIS shows the quantities of dredged materials disposed of in ODMDSs between 2005 and 2010 by the Mobile and New Orleans Districts.

The New Orleans District dredges an average annual 15.4 million yd^3 (11.8 million m^3). Current figures estimate that approximately 38 percent (or 7.7 million yd^3 [5.9 million m^3]) of that average is available for the beneficial use of dredge materials program (U.S. Dept. of the Army, COE, 2013). The remaining 62 percent of the total material dredged yearly by COE's New Orleans District is disposed of at placement areas regulated under Section 404 of the Clean Water Act, at ODMDSs, or it is stored in temporary staging areas located inland (e.g., the Pass a Loutre Hopper Dredge Disposal Site at the head of the Mississippi River's main "birdfoot" distributary channel system).

Cumulative Activities Scenario: BOEM anticipates that, over the next 40 years, the amount of dredged material disposed at ODMDSs will fluctuate generally within the trends established by the COE district offices. Between 2003 and 2013, the New Orleans District has averaged about 15.4 million yd^3 (11.8 million m^3) of material dredged per year disposed at ODMDSs, while the Mobile District is about one-quarter of that quantity, or 5.0 million yd^3 (3.8 million m^3) (refer to Table 3-9 of the CPA 235/241/247 Supplemental EIS). Quantities disposed at ODMDSs may decrease as more beneficial uses

of dredged material onshore are identified and evaluated. For a more complete and detailed discussion of dredged material disposal activities, refer to Chapter 3.3.3.1 of the 2012-2017 WPA/CPA Multisale EIS and CPA 235/241/247 Supplemental EIS.

3.3.3.2. OCS Sand Borrowing

If OCS sand is desired for coastal restoration or beach nourishment, BOEM uses the following two types of lease conveyances: a noncompetitive negotiated agreement that can only be used for obtaining sand and gravel for public works projects funded in part or whole by a Federal, State, or local government agency; and a competitive lease sale in which any qualified person may submit a bid. BOEM has issued 47 noncompetitive negotiated agreements but has never held a competitive lease sale for OCS sand and gravel resources. BOEM's Marine Minerals Program continues to focus on identifying sand resources for coastal restoration, investigating the environmental implications of using those resources, and processing noncompetitive use requests. In May 2015, BOEM issued one new agreement for the *Deepwater Horizon* NRDA Whiskey Island Restoration Project in Terrebonne Parish, Louisiana, using sand from Ship Shoal Block 88. In March 2014, BOEM issued a noncompetitive agreement for Phase Two of the Caminada Headland Restoration Project in Lafourche and Jefferson Parishes, Louisiana, using sand from South Pelto Blocks 13 and 14. Construction for Phase Two began in May 2015 with completion anticipated in May 2017.

BOEM has outlined its responsibility as steward of significant sand resources on the OCS in NTL 2009-G04, which states the following: "If it is determined that significant OCS sediment resources may be impacted by a proposed activity, the MMS GOMR may require you to undertake measures deemed economically, environmentally, and technically feasible to protect the resources to the maximum extent practicable. Measures may include modification of operations and monitoring of pipeline locations after installation." This NTL also provides guidance for the avoidance and protection of significant OCS sediment resources essential to coastal restoration initiatives in BOEM's Gulf of Mexico OCS Region. Over the next 40 years, increased use of OCS sand for Louisiana restoration projects is likely. Currently, no Texas restoration projects have been specifically identified. For more information on OCS sand borrowing, refer to Chapter 3.3.3.2 of the 2012-2017 WPA/CPA Multisale EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

3.3.3.3. Marine Transportation

Under current conditions, freight and cruise ship passenger marine transportation within the analyzed area should continue to grow at a modest rate or remain relatively unchanged based on historical freight traffic statistics under current conditions. In 2013, the Sabine-Neches Waterway had the highest vessel capacity, followed by the Port of New Orleans in terms of tonnage handled. The Port of Houston was the third largest port in the United States (USDOT, MARAD, 2015). Tankers carrying mostly petrochemicals account for about 60 percent of the vessel calls in the Gulf of Mexico. Dry-bulk vessels including bulk vessels, bulk containerships, cement carriers, ore carriers, and wood-chip carriers accounted for another 17 percent of the vessel calls. The Gulf supports a popular cruise industry. In 2011, there were 149 cruise ship departures from Galveston, 139 cruise ship departures from New Orleans, and 199 cruise ship departures from Tampa (USDOT, MARAD, 2012).

Total port use in the U.S. is increasing as a whole, and total port use within the GOM is also increasing. Over the last 10 years, the Gulf of Mexico port calls have represented approximately 32 percent of total U.S. port calls. Trends for GOM port calls relative to total U.S. port calls show an approximate 3 percent average increase of GOM port calls over the last decade, i.e., from 17,673 to 22,989 (USDOT, MARAD, 2013) (Table 3-10 of the CPA 235/241/247 Supplemental EIS).

Table 3-2 presents the estimated number of vessel trips that would occur as a result of the CPA proposed action. Annual OCS oil- and gas-related vessel traffic due to a typical CPA proposed action represents a small proportion (<1%) of the total vessel traffic in the GOM (**Chapter 3.1.1.8** of this Supplemental EIS and Chapter 3.1.1.8.4 of the 2012-2017 WPA/CPA Multisale EIS for a CPA proposed action). Annual OCS oil- and gas-related vessel traffic due to cumulative OCS oil- and gas-related activity represents between 9 and 12 percent of the total traffic in the GOM.

Cumulative Activities Scenario: It is expected that the usage of GOM ports will continue to increase by approximately 3 percent annually over the next 40 years. As such, it is anticipated that port calls by all

ship types will be bounded annually by a lower limit of current use and an upper limit of approximately 85,000 vessel port calls.

3.3.3.4. Military Activities

A standard military warning areas stipulation has been applied to all blocks leased in military areas in the GOM since 1977. The air space over the GOM is used by the U.S. Department of Defense (DOD) for conducting various military operations. Twelve military warning areas and six Eglin Water Test Areas (EWTAs) are located within the Gulf of Mexico (**Figure 2-2**. These military warning areas and EWTAs are multiple-use areas where military operations and oil and gas development have coexisted without conflict for many years. Several military stipulations are planned for leases issued within identified military areas.

CPA Activities Scenario: Six designated military areas and three EWTAs that are used for military operations lie wholly or partially within the CPA (**Figure 2-2**). The military warning areas within the CPA total approximately 13.3 million ac (about 23% of the total acreage of the CPA). The EWTAs within the CPA total approximately 7 million ac (about 12% of the total acreage of the CPA). Chapter 3.3.3.4 of the 2012-2017 WPA/CPA Multisale EIS describes military activities within the OCS.

In addition to the previously noted standard Military Areas Stipulation, the EWTAs will require the following special stipulations:

- *Evacuation Stipulation*: Lessee is required to evacuate, upon receipt of a directive from BOEM's Regional Director, all personnel from structures on the lease. Lessee must also shut-in and secure all wells and other equipment, including pipelines, on the lease.
- *Coordination Stipulation*: Lessee is required to consult with the appropriate military command headquarters regarding the location, density, and the planned periods of operation of surface structures on the lease, and to maximize exploration while minimizing conflicts with DOD activities prior to approval of an exploration plan by BOEM's Regional Director.

Cumulative Activities Scenario: BOEM anticipates that, over the next 40 years, the military use areas currently designated in the CPA, EPA, and WPA will remain the same and that none of them would be released for nonmilitary use. Over the cumulative activities scenario, BOEM expects to continue to require military coordination stipulations in these areas. The intensity of the military's use of these areas, or the type of activities conducted in them, is anticipated to fluctuate with the military mission needs.

3.3.3.5. Artificial Reefs and Rigs-to-Reefs Development

A full description of artificial reefs and Rigs-to-Reefs operations is presented in the 2012-2017 WPA/CPA Multisale EIS for a CPA proposed action. No new significant information was discovered that would alter impact conclusions based upon these operations. The following is a summary; for more details, refer to **Chapter 3.1.1.10** of this Supplemental EIS and Chapter 3.1.1.10 of the 2012-2017 WPA/CPA Multisale EIS.

Artificial reefs have been used along the coastline of the U.S. since the early 19th century. Stone (1974) documented that the use of obsolete materials to create artificial reefs has provided valuable habitat for numerous species of fish in areas devoid of natural hard bottom. Some studies have indicated that artificial reefs in marine waters not only attract fish but, in some instances, may also enhance the production of fish (Stone et al., 1979; Carr and Hixon, 1997; Dance et al., 2011). All of the five Gulf Coast States—Texas, Louisiana, Mississippi, Alabama, and Florida—have established State artificial reef programs and plans. These programs are guided by the National Artificial Reef Plan, a requirement of the National Fishing Enhancement Act of 1984. The lead agencies responsible for guiding and regulating artificial reef development are NOAA and the COE.

Offshore oil and gas platforms have been contributing hard substrate to the GOM since the first platform was installed in 1942. However, OCSLA and implementing regulations establish decommissioning obligations, including the removal of platforms. The Rigs-to-Reefs Policy provides a means by which lessees may request a waiver to the removal requirement. Although BSEE supports and

encourages the reuse of obsolete oil and gas structures as artificial reefs, lessees must meet specific requirements for a departure to be granted. In recent years, approximately 12 percent of the platforms decommissioned from the Gulf OCS have been used in authorized artificial reef programs (USDOI, BSEE, 2014b). Scientific and public interest in the ecology of offshore structures and the potential benefits of contributing substantial quantities of hard substrate to a predominantly soft bottom environment may lead to increased emphasis on the creation of artificial reefs through the Rigs-to-Reefs Policy. At present, Texas, Louisiana, Alabama, and Mississippi participate in the Rigs-to-Reefs Program.

WPA, CPA, and EPA Proposed Actions Scenario (Typical Lease Sale): The number of platform removals projected for a WPA, CPA, or EPA proposed action is 14-22, 32-61, and 0-1, respectively (**Table 3-2** of this Supplemental EIS for a CPA proposed action, Table 3-2 of the 2012-2017 WPA/CPA Multisale EIS for a WPA proposed action, and Table 3-2 of the EPA 225/226 EIS for an EPA proposed action). The number of platforms anticipated to be part of the Rigs-to-Reefs Program as a result of a WPA, CPA, or EPA proposed action is approximately 10 percent of the projected removals, or 1-2 in the WPA, 3-7 in the CPA, and up to 1 in the EPA.

OCS Program Scenario: Over the course of the 40-year cumulative activities scenario for the OCS Program (2012-2051), BOEM projects that a total of 1,279-1,837 platforms will be removed (**Table 3-4**). If approximately 10 percent of these structures are accepted into the Rigs-to-Reefs Program, there may be as many as 128-184 additional artificial reefs installed in the WPA, CPA, and EPA.

3.3.3.6. Offshore Liquefied Natural Gas Projects and Deepwater Ports

There are currently no LNG terminals operating on the OCS in the Gulf of Mexico. The following provides updates to the status of LNG projects and deepwater ports in the GOM, as provided in Chapter 3.3.3.6 of the 2012-2017 WPA/CPA Multisale EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS (USDOT, MARAD, 2014). Currently in the U.S., there is one offshore deepwater port in operation in the GOM: the Louisiana Offshore Oil Port (LOOP). The LOOP has received and transferred over 11 Bbbl of crude oil since its inception (LOOP, LLC, 2015). In 2015, Delfin LNG proposed an offshore floating LNG project in the U.S.; this project would be located approximately 45 mi (72 km) offshore of Cameron, Louisiana (*Federal Register*, 2015c). The proposed project schedule is to receive Federal approvals and the Deepwater Port Act license in 2016, to have offshore and onshore construction in 2017 to 2018, and to commence operations in 2019.

3.3.3.7. Development of Gas Hydrates

Chapter 3.3.3.7 of the 2012-2017 WPA/CPA Multisale EIS and CPA 235/241/247 Supplemental EIS describes the development of gas hydrates in detail. BOEM still anticipates that, within 40 years, it is likely that the first U.S. domestic production from hydrates may occur in Alaska. Gas obtained from onshore hydrates in Alaska will either support local oil and gas field operations or be available for commercial sale if and when a gas pipeline is constructed to the lower 48 states. However, Moridis et al. (2008) stated that one should not discount the possibility that the first U.S. domestic production of gas hydrates could occur in the GOM. Despite the substantially increased complexity and cost of offshore operations, there is a mature network of available pipeline capacity and easier access to markets in the Gulf of Mexico.

3.3.3.8. Renewable Energy and Alternative Use

The two primary categories of renewable energy that have the potential for development in the coastal and OCS waters of the U.S. are (1) wind turbines and (2) marine hydrokinetic systems. Chapter 3.3.3.8 of the 2012-2017 WPA/CPA Multisale EIS describes renewable energy and alternative use programs and potential action within the OCS, and it is updated in Chapter 3.3.3.8 of the CPA 241/247 and EPA 226 Supplemental EIS.

Cumulative Activities Scenario: BOEM expects that, over the next 40 years, a limited number of alternative use projects will be proposed in the WPA. It is also likely that these alternative use projects will consist of wind energy projects based on the current development of that technology. BOEM's expectation is based on the fact that known projects are being proposed in Texas State waters. Likewise, the potential alternative use projects could consist of a combination of integrated existing GOM infrastructure with new-built facilities.

3.3.4. Other Major Factors Influencing Coastal Environments

3.3.4.1. Sea-Level Rise and Subsidence

Given the results from the National Assessment of Coastal Vulnerability to Sea Level Rise, BOEM anticipates that, over the next 40 years, the northern GOM will likely experience a minimum relative sea-level rise of 55.2 millimeters (2.17 inches) and a maximum relative sea-level rise of 384 millimeters (15.1 inches) (Pendleton et al., 2010). Sea-level rise and subsidence together have the potential to affect many important areas, including the OCS oil and gas industry, oil and gas infrastructure, waterborne commerce, commercial fishery landings, and important habitat for biological resources (State of Louisiana, Coastal Protection and Restoration Authority, 2012a). Chapter 3.3.4.1 of the 2012-2017 WPA/CPA Multisale EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS describe sea-level rise and subsidence in detail. Programmatic aspects of climate change relative to the environmental baseline for the Gulf of Mexico OCS Program are discussed in Chapter 3.3 of the Five-Year Program EIS.

3.3.4.2. Mississippi River Hydromodification

Hydromodifying interventions include construction of (1) levees along the river and distributary channel systems, (2) upstream dams and flood control structures that impound sediment and meter the river flow rate, and (3) channelized canals with earthen or armored banks. Once the natural processes that act to add sediment to the delta platform to keep it emergent are shut down, subsidence begins to outpace deposition of sediment. BOEM anticipates that, over the next 40 years, there might be minor sediment additions resulting from new and continuing freshwater diversion projects managed by the COE. Chapter 3.3.4.2 of the 2012-2017 WPA/CPA Multisale EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS describe Mississippi River hydromodification in detail.

3.3.4.3. Maintenance Dredging and Federal Channels

The Gulf Intracoastal Waterway is a shallow-draft navigation channel constructed to provide a domestic connection between Gulf ports after the discovery of oil in East Texas in the early 1900's and to serve the growing need for the interstate transport of steel and other manufacturing materials. It extends approximately 1,400 mi (2,253 km) along the Gulf Coast from St. Marks, south of Tallahassee, in northwestern Florida to Brownsville, Texas. The length of the Gulf Intracoastal Waterway along the Florida coast is approximately 186 mi (300 km), along Alabama approximately 50 mi (80 km), along Mississippi approximately 70 mi (112 km), along Louisiana approximately 990 mi (1,600 km), and from the Sabine River through Texas to the Mexican Border 428 mi (690 km) (Good et al., 1995), which does not include the length of subsidiary channels included in the COE's maintenance programs. Maintenance dredging is performed by the COE on an as-needed basis along the Gulf Intracoastal Waterway and the subsidiary channels that directly or indirectly connect to it or open water. Typically, COE schedules surveys every 2 years for each navigation channel under its responsibility in order to maintain channel depth to specified standards.

For a more complete and detailed discussion of maintenance dredging and Federal channels, refer to Chapter 3.3.4.3 of the 2012-2017 WPA/CPA Multisale EIS and CPA 235/241/247 Supplemental EIS. For more information on coastal restoration programs, refer to **Chapter 3.3.4.4** of this Supplemental EIS and Chapter 3.4.4.4 of the 2012-2017 WPA/CPA Multisale EIS.

3.3.4.4. Coastal Restoration Programs

Coastal restoration programs are taking place on both the State and Federal levels. Current Federal efforts include the Coastal Wetlands Planning Protection and Restoration Act program; the Coastal Impact Assistance Program, which was formed in response to the Energy Policy Act of 2005; and the Gulf Coast Ecosystem Restoration Council, which was formed in response to the Resources and Ecosystems Sustainability, Tourist Opportunities and Revived Economies of the Gulf Coast States Act (RESTORE Act). For more information on coastal restoration programs, refer to Chapter 3.4.4.4 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

3.3.5. Natural Events and Processes

Chapter 3.3.5 of the 2012-2017 WPA/CPA Multisale EIS describes in detail natural events and processes in the GOM related to a CPA proposed action, including physical oceanography and hurricanes. Since 2009, most of the extreme atmospheric events in the GOM have been categorized as tropical storms with strong winds, heavy rain, and storm surges causing coastal flooding. However, on August 28, 2012, Hurricane Isaac made landfall in southeastern Louisiana as a Category 1 hurricane. While there were no reports of moderate or extensive damage to offshore oil or gas infrastructure in the GOM, Hurricane Isaac did result in the suspension of small amounts of tarballs and some oil from sediments (Mulabagal et al., 2013). In addition, Mitra et al. (2009) evaluated the extent to which Hurricanes Katrina and Rita in 2005 dispersed and resuspended sediments in marshes and in the shallow and deep shelf of the Gulf of Mexico. This conforms with predictions in the 2012-2017 WPA/CPA Multisale EIS analyses and is discussed more fully in **Chapter 4.1.1.2.1** of this Supplemental EIS.

3.3.6. Non-OCS Oil- and Gas-Related Oil Spills

Oil spills related to non-OCS oil- and gas-related activities such as State oil and gas activity or vessel collisions (including tankering, barging, or State oil and gas vessels) can result in the contamination of offshore or coastal environments. The Oil Pollution Act of 1990 strengthens planning and prevention activities in waters by (1) providing for the establishment of spill contingency plans for all areas of the U.S., (2) mandating the development of response plans for individual tank vessels and certain facilities for responding to a worst-case discharge or a substantial threat of such a discharge, and (3) providing requirements for spill-removal equipment and periodic inspections. Oil spills associated with the CPA proposed action are discussed in **Chapter 3.2.1** of this Supplemental EIS and Chapter 3.2.1 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS. For more information on the Oil Pollution Act of 1990 and other response requirements and initiatives regarding oil spills, refer to **Chapter 3.2.1.9** of this Supplemental EIS and Chapter 3.2.1.9 of the 2012-2017 WPA/CPA Multisale EIS. Spills from tankers involve the spillage of crude oil, whereas barge spills involve spills of both crude oil and other petroleum products. Anderson et al. (2012) noted that tanker spill rates have continued to have a substantial decline since 2000. Most likely, tanker spills have declined due to major regulatory changes in the early 1990's that substantially eliminated the use of single-hull tankers by requiring double hulls or their equivalent (Anderson et al., 2012). A majority of spills from tankers occurred in coastal areas (37 spills) versus offshore (16 spills) between 1974 and 2008. Barge spill rates for the last 15 years (1994 through 2008) declined dramatically as compared with the entire time period of available data (1974 through 2008), especially for crude oil barges and for both spill sizes ≥1,000 bbl and >10,000 bbl (Anderson et al., 2012). From 1974 through 2008, 197 petroleum spills ≥1,000 bbl (28 of which were crude oil spills) occurred from barges in U.S. coastal, offshore, and inland waters (including U.S. territorial waters). Because the data available on barge transport in U.S. waters do not differentiate between inland and coastal/offshore transport, inland transport was included.

CHAPTER 4

DESCRIPTION OF THE ENVIRONMENT AND IMPACT ANALYSIS

4. DESCRIPTION OF THE ENVIRONMENT AND IMPACT ANALYSIS

The impacts of 10 WPA and CPA lease sales were analyzed in the "prior 2012-2017 Gulf of Mexico EISs": *Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; Central Planning Area Lease Sales 227, 231, 235, 241, and 247, Final Environmental Impact Statement* (2012-2017 WPA/CPA Multisale EIS) (USDOI, BOEM, 2012b); and this analysis was updated in the *Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231, Final Supplemental Environmental Impact Statement* (WPA 233/CPA 231 Supplemental EIS) (USDOI, BOEM, 2013a); *Central Planning Area Lease Sales 235, 241, and 247, Final Supplemental Environmental Impact Statement* (CPA 235/241/247 Supplemental EIS) (USDOI, BOEM, 2014a); and *Central Planning Area Lease Sales 241 and 247 and Eastern Planning Area Lease Sale 226, Final Supplemental Environmental Impact Statement* (CPA 241/247 and EPA 226 Supplemental EIS) (USDOI, BOEM 2015a). An analysis of the routine, accidental, and cumulative impacts of the CPA proposed action on the environmental, socioeconomic, and cultural resources of the GOM can be found in Chapter 4.2.1 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS; these EISs are hereby incorporated by reference.

The purpose of this Supplemental EIS is to determine if there are significant new circumstances or information bearing on the CPA proposed action or its impacts, as previously discussed in the prior 2012-2017 Gulf of Mexico EISs and, if so, to disclose those changes and conclusions. This includes all relevant new information available since publication of the prior 2012-2017 Gulf of Mexico EISs. This Supplemental EIS analyzes the potential impacts of the CPA proposed action (**Chapter 4.1.1**) on the sensitive coastal environments, offshore marine resources, onshore and offshore socioeconomic resources, and cultural resources.

4.1. PROPOSED CENTRAL PLANNING AREA LEASE SALE 247

Proposed CPA Lease Sale 247 is tentatively scheduled to be held in March 2017. The proposed CPA lease sale area encompasses about 63 million ac of the total CPA area of 66.45 million ac. This area begins 3 nmi (3.5 mi; 5.6 km) offshore Louisiana, Mississippi, and Alabama, and extends seaward to the limits of the United States' jurisdiction (often the Exclusive Economic Zone) in water depths up to approximately 3,346 m (10,978 ft) (**Figure 1-1**). As of August 2016, approximately 47.39 million ac of the proposed CPA lease sale area are currently unleased. This information is updated monthly and can be found on BOEM's website at http://www.boem.gov/Gulf-of-Mexico-Region-Lease-Map/. The CPA proposed action would offer for lease all unleased blocks within the proposed CPA lease sale area for oil and gas operations (**Figure 2-1**), with the following exceptions:

(1) whole and portions of blocks deferred by the Gulf of Mexico Energy Security Act of 2006; and

(2) blocks that are adjacent to or beyond the United States' Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap.

The DOI is conservative throughout the NEPA process and includes the total area within the CPA for environmental review even though the leasing of portions of the CPA (subareas or blocks) can be deferred during a Five-Year Program.

Chapter 4.1.1 presents a brief summary of the baseline data for the physical, biological, and socioeconomic resources that would potentially be affected by the CPA proposed action or the alternatives. For additional information on the baseline data for the physical, biological, and socioeconomic resources that would potentially be affected by the CPA proposed action or the alternatives, refer to Chapter 4.2.1 of the 2012-2017 WPA/CPA Multisale EIS and to updated information provided in Chapter 4.2.1 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1 of the WPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS.

Chapter 4.1.1 also presents analyses of the potential impacts of routine events, accidental events, and cumulative activities associated with the CPA proposed action or the alternatives on these resources. Baseline data are considered in the assessment of impacts from proposed CPA Lease Sale 247 on these resources. In addition, **Appendix B** ("Catastrophic Spill Event Analysis") serves as a complement to this chapter and provides additional analysis of the potential impacts of a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, to the environmental and cultural resources and the socioeconomic conditions analyzed below.

The *Deepwater Horizon* explosion off the Louisiana coast resulted in the largest oil spill in U.S. history. An event such as this has the potential to adversely affect multiple resources over a large area. The level of adverse effect depends on many factors, including the sensitivity of the resource as well as the sensitivity of the environment in which the resource is located. All effects may not initially be seen and some could take years to fully develop. The following analyses of impacts from the *Deepwater Horizon* explosion, oil spill, and response on the physical, biological, and socioeconomic resources are based on post-*Deepwater Horizon* credible scientific information that was publicly available at the time this document was prepared. This credible scientific information was applied using accepted methodologies, including numerical modeling of data and scientific writing methods to convey the information of BOEM's subject-matter experts' technical knowledge and experience. The Deepwater Horizon Natural Resource Damage Assessment Trustees (NRDA Trustees) published the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* (Final PDARP/PEIS) in February 2016 (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016), and information from the Final PDARP/PEIS has been incorporated, as appropriate, into this Final Supplemental EIS. Even with the release of the Final PDARP/PEIS, BOEM recognizes that incomplete or unavailable information, with respect to a variety of resources evaluated in this Supplemental EIS will continue. Included in the NRDA Trustees' Final PDARP/PEIS is an injury assessment that involved two main steps: injury determination and injury quantification, and the Trustees' proposed restoration plan. Even though the NRDA Trustees have conducted their injury assessment, as restoration activities proceed, the Trustee Implementation Groups may reassess whether the conditions and environmental effects described in the Final PDARP/PEIS have changed. As such, the NRDA Trustee Implementation Groups will continue to interpret impacts arising out of that spill into the future. Because studies and the interpretation of impacts continue, instances remain in which BOEM will be faced with incomplete or unavailable information that may be relevant to evaluating reasonably foreseeable significant adverse impacts on the human environment. While incomplete or unavailable information could conceivably result in potential future shifts in baseline conditions of habitats that could affect BOEM's decisionmaking, BOEM has determined that there is sufficient basis to proceed with this Supplemental EIS while operating on the basis of the most current available data and expertise of BOEM's subject-matter experts.

Chapter 4.1.1 and Appendix B provide a summary of existing credible scientific evidence related to this issue and BOEM's evaluation of potential impacts based upon theoretical approaches or research methods generally accepted in the scientific community and based upon information presented in the NRDA Trustees' Final PDARP/PEIS. BOEM has determined that it can make an informed decision even without this incomplete or unavailable information because BOEM utilizes the best available scientifically credible information in its decisionmaking process and because BOEM's experts can apply other scientifically credible information using accepted theoretical approaches and research methods, such as information on related or surrogate species. Moreover, BOEM will continue to monitor these resources and related studies for effects caused by the *Deepwater Horizon* explosion, oil spill, and response, and will ensure that future BOEM environmental reviews take into account any new information that may emerge.

Analytical Approach

The analyses of potential effects to the wide variety of physical, environmental, and socioeconomic resources in the vast area of the GOM and adjacent coastal areas are complex. Specialized education, experience, and technical knowledge are required, as well as familiarity with the numerous impact-producing factors associated with oil and gas activities and other activities that can cause cumulative impacts in the area. Knowledge and practical working experience of major environmental laws and regulations such as NEPA, the Clean Water Act, Clean Air Act, Coastal Zone Management Act (CZMA),

Endangered Species Act (ESA), Marine Mammal Protection Act, the Magnuson-Stevens Fishery Conservation and Management Act, and others are also required.

In order to accomplish this task, BOEM has assembled a multidisciplinary staff with hundreds of years of collective experience. The vast majority of this staff has advanced degrees with a high level of knowledge related to the particular resources discussed in this chapter. This staff prepares the input to BOEM's lease sale EISs and a variety of subsequent postlease NEPA reviews, and they are also involved with ESA, essential fish habitat (EFH), and CZMA consultations. In addition, this same staff is also directly involved with the development of studies conducted by BOEM's Environmental Studies Program. The results of these studies feed directly into our NEPA analyses.

For this Supplemental EIS, BOEM developed a set of assumptions and a scenario, and described the impact-producing factors that could occur from routine oil and gas activities, as well as accidental events. These assumptions, scenario, and factors are summarized in **Chapter 3** of this Supplemental EIS and are discussed in detail in Chapter 3 of the 2012-2017 WPA/CPA Multisale EIS. On the basis of these assumptions, scenario, and factors, BOEM's multidisciplinary staff applies its knowledge and experience to analyze the potential effects that could arise out of proposed CPA Lease Sale 247.

For most resources, the conclusions developed by BOEM's subject-matter experts regarding the potential effects of proposed CPA Lease Sale 247 are necessarily qualitative in nature; however, these conclusions are based on the expert opinion and judgment of highly trained subject-matter experts. BOEM's staff approaches this effort in good faith utilizing credible scientific information including, but not limited to, information available since the *Deepwater Horizon* explosion, oil spill, and response, and applying this information using accepted methodologies, including numerical modeling of data and scientific writing methods to convey the information of the subject-matter experts' technical knowledge and experience. It must also be emphasized that, in arriving at the overall conclusions for certain environmental resources (e.g., coastal and marine birds, fisheries, and wetlands), the conclusions are not based on impacts to individuals, small groups of animals, or small areas of habitat, but on impacts to the resources/populations as a whole. Where relevant information on reasonably foreseeable significant adverse impacts is incomplete or unavailable, the need for the information was evaluated to determine if it was essential to a reasoned choice among the alternatives. If BOEM's subject-matter experts determined that the incomplete or unavailable information was essential, BOEM made good faith efforts to acquire the information. In the event that BOEM was unable to obtain essential information due to either impossibility or exorbitant cost, BOEM applied accepted scientific methodologies in place of that information. This approach is described in the next subsection on "Incomplete or Unavailable Information."

Over the years, BOEM has developed a suite of lease stipulations and mitigating measures to eliminate or ameliorate potential environmental effects. In many instances, these lease stipulations and mitigating measures were developed in coordination with other natural resource agencies such as NMFS and FWS.

Throughout its effort to prepare this Supplemental EIS, BOEM has complied with the spirit and intent of NEPA, to avoid being arbitrary and capricious in its analyses of potential environmental effects, and to use adaptive management to respond to new developments related to the OCS Program.

Incomplete or Unavailable Information

In the following analyses of physical, environmental, and socioeconomic resources, BOEM identifies situations in which its analysis contains incomplete or unavailable information. The major area where BOEM is faced with incomplete or unavailable information is in relation to the *Deepwater Horizon* explosion, oil spill, and response. However, with the recent publication of the NRDA Trustees' Final PDARP/PEIS in February 2016 (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016), which includes the NRDA Trustee's injury assessment, and the release of a series of studies that evaluate the effects of the *Deepwater Horizon* explosion, oil spill, and response on marine and coastal resources (USDOI, FWS, 2015a-e; White et al., 2012; Hsing et al., 2013; Fisher et al., 2014, and Montagna et al., 2013), the incomplete or unavailable information gap is decreasing. Even with the publication of the Final PDARP/PEIS, information related to the explosion, oil spill, and response is still being collected, interpreted, and analyzed. In cases where those in charge of analyzing impacts from the spill have not yet shared their data and findings with BOEM or made this information publicly available, BOEM's subject-matter experts were faced with incomplete or unavailable information. The subject-

matter experts for each resource utilized the most recent publicly available, scientifically credible information from other sources to support the conclusions contained in this Supplemental EIS. This information is identified and summarized in **Chapter 4.1.1** of this Supplemental EIS and is discussed in detail for each resource in Chapter 4.2.1 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. In certain circumstances, identified and described in more detail in **Chapter 4.1.1** of this Supplemental EIS, BOEM's subject-matter experts were required to utilize accepted methodologies to extrapolate conclusions from existing or new information and to make reasoned estimates and developed conclusions regarding the current CPA baseline for resource categories and expected impacts from the CPA proposed action given any baseline changes. For reasons described below, there are no changes to the conclusions presented in the prior 2012-2017 Gulf of Mexico EISs.

It is important to note that, barring another catastrophic oil spill, which is a low-probability event that is not part of the CPA proposed action and not likely nor expected to occur, the adverse impacts associated with the proposed CPA lease sale would be small This is because of lease sale stipulations that are typically applied and because of BOEM's and other Federal and State entities' mitigating measures. BOEM also imposes site-specific mitigations that become conditions of plan or permit approval at the postlease stage. Collectively, these measures further reduce the likelihood and/or severity of adverse impacts.

For the following resources, as with the prior 2012-2017 Gulf of Mexico EISs, the subject-matter experts determined that there is incomplete or unavailable information that is relevant to reasonably foreseeable significant adverse impacts; however, it is not essential to a reasoned choice among alternatives.

- *Natural Resource Damage Assessment (NRDA) Data*: Under the authority of the Oil Pollution Act of 1990, the *Deepwater Horizon* NRDA Trustees undertook an injury assessment to assess the impacts to all natural resources in the GOM that may have been impacted by the resulting spill from the *Macondo* well, as well as impacts from the spill-response operations. The injury assessment was conducted between 2010 and 2015. During that time period, the Trustees developed and implemented hundreds of scientific studies to access the impacts of the *Deepwater Horizon* oil spill on natural resources. As part of the NRDA process, over 100,000 samples of water, tissue, oil, and sediment were collected and stored in the Data Integration, Visualization, and Reporting system (DIVER) (USDOC, NOAA, 2016). The DIVER is NOAA's public data warehouse and query tool for *Deepwater Horizon* response data. The NRDA Trustees published a Draft PDARP/PEIS on October 5, 2015. The Final PDARP/PEIS was published in February 2016. The Record of Decision for the Final PDARP/PEIS was signed on March 22, 2016. With the release of the Draft and Final PDARP/PEISs, which includes the NRDA injury assessment and the completion of numerous studies that evaluate the effects of the *Deepwater Horizon* explosion, oil spill, and response on marine and coastal resources, BOEM has utilized this information in its NEPA analyses. Even with the release of the Final PDARP/PEIS, information related to the *Deepwater Horizon* explosion, oil spill, and response is still being collected, interpreted, and analyzed. BOEM acknowledges that the ability to obtain and use the NRDA data in its NEPA analyses could be relevant to reasonably foreseeable significant adverse impacts; however, the NRDA data are not essential to a reasoned choice among the alternatives. Impacts identified through the NRDA process would likely be the same under any alternative and obtaining these data would not help inform the decisionmaker on a reasoned choice among those alternatives. This is because, as discussed above, the adverse impacts associated with the proposed CPA lease sale are small, even in light of how baseline conditions in the CPA may have been changed by the *Deepwater Horizon* explosion, oil spill, and response. The impacts are expected to be small because of BOEM's lease sale stipulations and mitigating measures, site-specific mitigations that become conditions of plan or permit approval at the postlease stage, and mitigations required by other State and Federal agencies. Some NRDA data currently is available in DIVER (USDOC, NOAA,

2016); however, other data that were previously collected may not be available, and additional data may be collected in the future that may not become available for many years. The NEPA allows for decisions to be made based on available scientifically credible information (e.g., peer-reviewed journals and studies, government reports, etc.) applied using accepted methodologies where the incomplete information cannot be obtained or the cost of obtaining it is exorbitant. Even though the NRDA injury assessment has been released, data continue to become available and studies continue to be released related to the *Deepwater Horizon* oil spill. In light of the fact that the NRDA data in its entirety may not be available for years, BOEM has used accepted scientific methodologies to evaluate each resource, as described in this chapter. Since the spill, BOEM's Gulf of Mexico OCS Region's Environmental Studies Program has continually modified its Studies Plan to reflect the Agency's current information needs for studies that address impacts and recovery from the oil spill. The scientific studies conducted by the Environmental Studies Program provide some of the data that BOEM relies on in making decisions in this Supplemental EIS. BOEM's proposed studies attempt to avoid duplication of study efforts while striving to fill information gaps where NRDA studies may not address particular resources and their impacts from the oil spill.

- *Physical Resources in the CPA*: Physical resources (i.e., water quality and air quality) within the CPA are likely not continuing to be affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and response, based on the best available information, including recent sampling data. Although unable to speculate as to the results of ongoing NRDA studies, BOEM has determined that the incomplete or unavailable information is not essential to a reasoned choice among alternatives because BOEM utilizes the best available scientifically credible information in its decisionmaking process. As part of the NRDA process, over 100,000 samples of water, tissue, oil, and sediment were collected and stored in DIVER (USDOC, NOAA, 2016). The DIVER is NOAA's public data warehouse and query tool for *Deepwater Horizon* response data. BOEM has utilized available information and information found in the Trustee's Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016), which includes the NRDA Trustee Council's injury assessment in its NEPA analyses. Other information related to the *Deepwater Horizon* explosion, oil spill, and response may not be available for some time, regardless of the costs necessary to obtain this information, as there are numerous task forces and interagency groups involved in the production of the information. It is not expected that all these data would become publicly available in the near term, and certainly not within the timeline contemplated in the NEPA analysis of this Supplemental EIS.
- *Coastal and Offshore Habitats within the CPA*: Many coastal and offshore habitats (e.g., beaches, wetlands, hard bottoms, and soft bottoms) in the CPA were affected by the *Deepwater Horizon* explosion, oil spill, and response. Recent research has documented specific examples of acute and chronic effects to habitat-forming organisms and has identified evidence of persistent spill-related contaminants in seafloor sediments (refer to **Chapters 4.1.1.3, 4.1.1.4, 4.1.1.6, 4.1.1.7, 4.1.1.9, 4.1.1.10, and 4.1.1.11**). Based on the best available information, including recent sampling data, overall adverse impacts to CPA coastal and offshore habitats are estimated to be substantial. BOEM has utilized recent research about the effects of the *Deepwater Horizon* explosion, oil spill, and response on coastal and offshore habitats and information found in the Trustee's PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016), which includes the Trustee's injury assessment, in its NEPA analyses. However, long-term impacts to the affected habitats and associated communities are currently unknown and BOEM cannot speculate as to the results of ongoing NRDA studies. BOEM has determined that the incomplete or unavailable information regarding coastal and offshore habitats is not

essential to a reasoned choice among alternatives because BOEM utilizes the best available scientifically credible information in its decisionmaking process.

- *Biological Resources within the CPA*: Biological resources (i.e., birds, fish, and marine invertebrates) within the CPA may have been affected directly or indirectly by the *Deepwater Horizon* explosion, oil spill, and response, or by residual impacts to habitats. Researchers documented some of the effects that likely resulted from coating, ingestion, or other contact with polycyclic aromatic hydrocarbons and/or spill-related contaminants. The known and likely impacts documented in recent studies include physiological and ecological effects to individuals and communities. BOEM has utilized recent research about the effects of the *Deepwater Horizon* explosion, oil spill, and response on biological resources and information found in the Trustee's Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016), which includes the Trustee's injury assessment, in its NEPA analyses. Although various biological and environmental factors could mask more extensive impacts and the results of ongoing NRDA analyses are not yet available, the best available science indicates adverse effects were limited (relative to overall populations). Therefore, BOEM has determined that the incomplete or unavailable information is not essential to a reasoned choice among the alternatives because the adverse impacts from routine activities associated with the CPA proposed action are expected to be small.

- *Endangered and Threatened Species*: BOEM reinitiated consultation with NMFS and FWS in light of new information that may become available on these species and in light of effects from the *Deepwater Horizon* explosion, oil spill, and response. Pending the completion of the reinitiated ESA section 7 consultation, BOEM has prepared an ESA section 7(d) determination (50 CFR § 402.09). Section 7(d) of the ESA requires that, after initiation or reinitiation of consultation under section 7(a)(2), the Federal agency "shall not make any irreversible or irretrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative measures which would not violate" section 7(a)(2). BOEM has determined that the CPA proposed action during the reinitiated section 7 consultation period is consistent with the requirements of ESA section 7(d) because (1) approving and/or conducting the proposed CPA lease sale will not foreclose the formulation or implementation of any Reasonable and Prudent Alternative measures that may be necessary to avoid jeopardy (or the likely destruction or adverse modification of critical habitat) and (2) the Secretary of the Interior retains the discretion under OCSLA to deny, suspend, or rescind plans and permits authorized under OCSLA at any time, as necessary to avoid jeopardy. Lease sales alone do not constitute an irreversible and irretrievable commitment of resources. In addition, the results of consultation and any additional relevant information on endangered and threatened species can be employed during postlease activities to ensure that Reasonable and Prudent Alternative measures are not foreclosed. BOEM and BSEE have developed an interim coordination program with NMFS and FWS for individual consultations on postlease activities requiring permits or plan approvals while formal consultation and development of a new Biological Opinion is ongoing.

- *Socioeconomic and Cultural Resources*: Incomplete or unavailable information related to socioeconomic and cultural impacts (i.e., commercial and recreational fishing, recreational resources, archaeological resources, land use and coastal infrastructure, demographics, economic factors, and environmental justice) may be relevant to reasonably foreseeable adverse impacts on these resources. BOEM has utilized information found in the Trustee's Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016), which includes the Trustee's injury assessment, in its NEPA analyses. Although unable to speculate as to the results of ongoing NRDA studies, BOEM has determined that the incomplete or

unavailable information would not be essential to a reasoned choice among alternatives because BOEM utilizes the best available scientifically credible information in its decisionmaking process and cannot speculate as to the results of ongoing *Deepwater Horizon* NRDA studies.

This chapter has thoroughly examined the existing credible scientific evidence that is relevant to evaluating the reasonably foreseeable significant adverse impacts of the proposed CPA lease sales on the human environment. The subject-matter experts that prepared this Supplemental EIS conducted a diligent search for pertinent new information, and BOEM's evaluation of such impacts is based upon theoretical approaches or research methods generally accepted in the scientific community. All reasonably foreseeable impacts were considered, including impacts that could have catastrophic consequences, even if their probability of occurrence is low (**Appendix B**). Throughout this chapter, where information was incomplete or unavailable, BOEM complied with its obligations under NEPA to determine if the information was relevant to reasonably foreseeable significant adverse impacts; if so, whether it was essential to a reasoned choice among alternatives; and, if it is essential, whether it can be obtained and whether the cost of obtaining the information is exorbitant, as well as whether generally accepted scientific methodologies can be applied in its place (40 CFR § 1502.22).

4.1.1. Alternative A—The Proposed Action

4.1.1.1. Air Quality

BOEM has reexamined the analysis for air quality presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for air quality presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.1 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.1 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The following routine activities associated with the CPA proposed action would potentially affect air quality: platform construction and emplacement; platform operations; drilling activities; flaring; venting; seismic-survey and support-vessel operations; pipeline laying and burial operations; evaporation of volatile petroleum hydrocarbons during transfers; and fugitive emissions. The impact analysis is based on four parameters—emission rates, surface winds, atmospheric stability, and mixing height. Emissions of pollutants into the atmosphere from the activities associated with the CPA proposed action are projected to have minimal effects on onshore air quality because of the prevailing atmospheric conditions, emission rates and mixing heights, and the resulting pollutant concentrations.

The accidental release of hydrocarbons related to the CPA proposed action would result in the emission of air pollutants. The OCS oil- and gas-related accidents could include the release of oil, condensate, natural gas, and chemicals used offshore, or pollutants, which could include greenhouse gases, from the burning of these products. The air pollutants include criteria NAAQS pollutants, volatile and semi-volatile organic compounds, H_2S, and methane. If a fire was associated with the accidental event, it would produce a broad array of pollutants, including NAAQS-regulated primary pollutants, nitrogen dioxide (NO_2), carbon monoxide (CO), sulphur dioxide (SO_2), volatile organic compounds (VOCs), particulate matter less than or equal to 10 μm (PM_{10}), and particulate matter less than or equal to 2.5 μm ($PM_{2.5}$). Response activities to an accidental event that could impact air quality include in-situ burning, the use of flares to burn gas and oil, and the use of dispersants applied from aircraft. The

burning of oil and gas may also produce black carbon. Black carbon is the most strongly light-absorbing component of particulate matter and is formed by the incomplete combustion of fossil fuels, biofuels, and biomass. Measurements taken during an in-situ burning show that a major portion of compounds was consumed in the burn (Fingas et al., 1995), and it was found that, during the burn, the pollutants were measured only at background levels; therefore, pollutant concentrations would be expected to be within the NAAQS. Accidents involving high concentrations of H_2S could result in deaths as well as environmental damage. Regulations and NTLs include safeguards and protective measures, which are in place to protect workers from H_2S releases. Other emissions of pollutants into the atmosphere from accidental events as a result of the CPA proposed action are not projected to have significant impacts on onshore air quality because of the prevailing atmospheric conditions, emissions height, emission rates, and the distance of these emissions from the coastline.

Cumulative Impacts

The cumulative analysis considers OCS oil- and gas-related and non-OCS oil- and gas-related activities that could occur and adversely affect onshore air quality from OCS oil- and gas-related sources during the 40-year analysis period. The OCS oil- and gas-related activities that could impact air quality include the following: platform construction and emplacement; platform operations; drilling activities; flaring; seismic-survey and support-vessel operations; pipeline laying and burial operations; evaporation of volatile petroleum hydrocarbons during transfers; fugitive emissions; the release of oil, condensate, natural gas, and chemicals used offshore, or pollutants from the burning of these products; a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur (refer to **Appendix B** for more details); and fires. Emissions of pollutants into the atmosphere from activities associated with the OCS Program are not projected to have significant effects on onshore air quality because of the prevailing atmospheric conditions, emission rates and heights, and the resulting pollutant concentrations, which result in dilution of the emissions offshore before they reach the shoreline. In the CPA, the impacts of the OCS oil- and gas-related emissions on the onshore air quality are annual NO_2 ($0.4\mu/m^3$) and 24-hour $PM_{2.5}$ ($0.3\mu/m^3$) in the Class I area, which exceed the USEPA's Significant Impact Levels (SILs) for annual NO_2 ($0.1\mu/m^3$) and 24-hour $PM_{2.5}$ ($0.07\mu/m^3$) in the Class I area. However, onshore impacts on air quality from emissions from OCS oil- and gas-related activities are estimated to be within the Prevention of Significant Deterioration (PSD) Class II allowable increments. The background concentration and impact concentration are below the NAAQS. The only potential exception is for ozone, where there may be some minimal contribution to ozone at the shoreline.

Non-OCS oil- and gas-related activity includes both marine and onshore industries and activities that are unrelated to oil and gas exploration and production. The non-OCS oil- and gas-related activities in the cumulative scenario that could potentially impact onshore air quality include the following: State oil and gas programs; other major offshore but non-OCS oil- and gas-related factors influencing offshore environments (such as sand borrowing and transportation); onshore non-OCS oil- and gas-related activities such as emissions from industry (including major stationary sources, e.g., power plants, petroleum refineries and chemical plants) and mobile sources (cars/trucks) related to human activities; onshore non-OCS oil- and gas-related sources unrelated to human activities such as forest fires; accidental releases from an oil spill; accidental releases of hydrogen sulfide; and natural events (e.g., hurricanes). The non-OCS oil- and gas-related activity on the water that would most likely contribute to cumulative impacts to air quality would be the marine shipping or transportation industry. Industrial activity in the industrial areas of Louisiana, Mississippi, and Alabama and emissions from cars in areas with high populations are the onshore sources that would contribute to the cumulative impact to air quality. These non-OCS oil- and gas-related activities generate greater amounts of emission sources than OCS oil- and gas-related activities. Human populations reside near these same industries because they offer employment, and therefore humans encounter more air contaminants as a result of non-OCS oil- and gas-related activities than they do from the OCS Program. These non-OCS oil- and gas-related sources would represent the majority of the cumulative emissions that are present at onshore locations (Wheeler et al., 2008).

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search of State and Federal databases, including updates to regulations, was conducted to determine the availability of recent information. The search revealed new information on the impacts of black carbon to air quality since publication of the prior 2012-2017 Gulf of Mexico EISs. This information is pertinent to this Supplemental EIS because it details new information on non-OCS oil- and gas-related impacts to the environment.

Black carbon is emitted directly into the atmosphere in the form of fine particulates, is the most strongly light-absorbing component of particulate matter, and is formed by the incomplete combustion of fossil fuels, biofuels, and biomass. It is linked to climate impacts, particularly in the Arctic, and visibility impacts. The total cumulative $PM_{2.5}$ from OCS sources is in the range between 4,714 and 7,687 tons/year. In 2005, the United States is estimated to have emitted about 0.64 million tons of black carbon (USEPA, 2015). According to the USEPA, 12 percent of the total amount of $PM_{2.5}$ is converted to black carbon. It is assumed that all PM_{10} is converted to $PM_{2.5}$; therefore, the total amount of $PM_{2.5}$ emitted from OCS sources is between 569 and 926 tons/year. The contribution of black carbon from OCS sources is from about 0.09 to 0.15 percent of that of the United States. It is assumed that all PM_{10} is converted to $PM_{2.5}$; therefore, the estimated total amount of black carbon from OCS sources is overly conservative. A surface oil burn was conducted in the *Deepwater Horizon* oil spill, in which it was estimated that approximately 10 kilograms (kg) (22 pounds [lb]) of black carbon was released into the atmosphere in the Gulf of Mexico during a period of the 9-week spill (Perring et al., 2011; refer to **Appendix B** for more detail).

During the preparation of this Final Supplemental EIS, the Council on Environmental Quality released their "Final Guidance for Federal Departments and Agencies on the Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews" on August 1, 2016 (Council on Environmental Quality, 2016). That guidance indicated a preference that agencies should quantify GHG emissions where possible or use qualitative approaches when quantitative analyses are unavailable or ill-suited to a specific NEPA analysis. The CEQ guidance gives discretion to the agency to determine which approach is most feasible and to determine whether the guidance could be incorporated into EISs or EAs that were already in preparation at the time the final guidance was issued. BOEM continues to review the final guidance and will expand, as appropriate, its qualitative and quantitative analyses of GHG emissions and impacts. BOEM is currently working in cooperation with other Federal agencies to prepare a report quantifying both upstream and downstream emissions related to OCS oil and gas production and consumption. This report will compare and contrast emissions from various leasing scenarios, as well as generate the social cost of carbon estimates (i.e., estimates of the economic damages associated with CO_2 emissions) for OCS oil- and gas-related emissions. These estimates from the forthcoming report will be used in future decision documents as a proxy for assessing climate change impacts. Although the emissions report described above is not yet publicly available, BOEM believes that it is not essential to a reasoned choice among alternatives for this proposed lease sale.

BOEM has analyzed the potential direct emissions from OCS oil- and gas-related activities, while also comparing the indirect effects of OCS oil and gas production on overall GHG levels, which are highly driven by demand and the availability of oil and gas substitutes. In the Five-Year Program EIS, BOEM compares GHG emissions from OCS oil and gas with those that could occur from energy substitutes that would presumably replace OCS production in the absence of a new OCS Program and comparable demand levels. Downstream greenhouse gases are not quantified but are qualitatively discussed. The supporting economic analysis report concludes that the consumption of OCS fuels does not have much of an impact on overall GHG emissions because there is assumed to be limited change in demand (Industrial Economics, Inc. 2012), which would be met with alternative supplies. Therefore, even cancelling an individual proposed lease sale (the No Action Alternative) would not have a significant or even noticeable effect on GHG emissions, as existing demand is likely to continue and would be expected to be met with energy substitutes, still relying heavily on oil and gas supplies from areas other than the OCS. That analysis reflects the assumption that both future energy demand and supply will mirror historical trends, and it does not consider any possible climate change policy

interventions, which could potentially implicate demand or supply, price, or modes of domestic or global substitution.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. However, as discussed in this Supplemental EIS and in Chapter 4.2.1.1 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, BOEM has identified unavailable information regarding air quality impacts related to the *Deepwater Horizon* explosion, oil spill, and response in the CPA. This information cannot be obtained because the means to obtain it are not known. This unavailable information may be relevant to adverse effects because air emissions could have reached land or dispersed throughout the WPA/CPA before the oil-spill response was activated. BOEM used relevant analysis such as air emissions measurements taken by Federal agencies to determine air impacts. For example, a large number of air emissions measurements were obtained and released to the public by USEPA, the National Oceanic and Atmospheric Administration, and other agencies, indicating that air emissions impacts tended to be minor and below USEPA's health-based standards. And, since there are no continuing sources of air pollution related to the *Deepwater Horizon* explosion, oil spill, and response, BOEM would not expect any additional measurements or information to alter the conclusions from currently existing data.

In addition, as noted in Appendix A of the CPA 235/241/247 Supplemental EIS, there are a number of competing methods and available models for estimating and tracking potential air emissions and impacts. Each of these methods and models has inherent limitations, particularly with regard to the offshore environment in which the CPA proposed action would take place. BOEM's Offshore and Coastal Dispersion Model, which was used for this environmental impact assessment (Appendix A of the CPA 235/241/247 Supplemental EIS), has limitations such that it is a short-range dispersion model and it does not involve the reactive chemistry. In acknowledgement of these limitations, BOEM's subject-matter experts, using their best professional judgment and experience, have developed conservative assumptions and modeling parameters so as to ensure that the impact conclusions herein are reasonable and not underestimated (refer to Appendix A of the CPA 235/241/247 Supplemental EIS for the modeling analysis). The modeling that was conducted was overly conservative. All of the emissions during 1 year for the entire CPA, which would actually be dispersed throughout the CPA, were modeled as if they originated in a single block, i.e., Mississippi Canyon Block 856. This block was selected because it represented a location where the water is deep enough that a dynamically positioned drillship would be used and where hydrocarbons are probably present. Although there are limitations in air quality modeling, the evidence currently available and that was used to develop conservative assumptions, supports past analyses and does not indicate severe adverse impacts to air quality.

BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing the relevant analysis and formulating the conclusions presented here. Although there is incomplete or unavailable information, the evidence currently available supports past analyses and does not indicate reasonably foreseeable significant adverse impacts. Therefore, BOEM has determined that this information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for air quality presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for air quality presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. Emissions of pollutants into the atmosphere from the routine activities and accidental events associated with the CPA proposed action are projected to have minimal impacts to onshore air quality, and emissions of pollutants into the atmosphere from activities associated with the OCS Program are also not projected to have significant effects on onshore air quality. The non-OCS oil- and gas-related emission sources of intercontinental origin and the hydraulic fracturing of reservoirs may have the potential to impact onshore air quality and human health. However, the new

information does not alter previous impact conclusions for air quality. The analysis and potential impacts discussed in those NEPA documents still apply for proposed CPA Lease Sale 247.

4.1.1.2. Water Quality

4.1.1.2.1. Coastal Waters

BOEM has reexamined the analysis for coastal water quality presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for coastal water quality presented in the prior 2012-2017 Gulf of Mexico EISs. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

Coastal waters within the CPA, as defined by BOEM, include all the bays and estuaries from the Louisiana/Texas State border to the Alabama/Florida State border. A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.2.1 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.2.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The routine activities associated with the CPA proposed action that would impact coastal water quality include the following:

- discharges during drilling of exploration and development wells;
- structure installation and removal;
- discharges during production;
- installation of pipelines;
- workovers of wells,
- maintenance dredging of existing navigational canals;
- service-vessel discharges; and
- nonpoint-source runoff from platforms and OCS Program-related vessels.

These routine activities and associated impact-producing factors are discussed in detail in the 2012-2017 WPA/CPA Multisale EIS. The primary impacting sources to water quality in coastal waters from oil and gas exploration and production activities are point-source and storm-water discharges from support facilities, vessel discharges, and nonpoint-source runoff. These activities are not only highly regulated but also localized and temporary in nature. The impacts to coastal water quality from routine activities associated with the CPA proposed action should be minimal because of the distance to shore of most routine activities, USEPA and USCG regulations that restrict discharges, and few, if any, new pipeline landfalls or onshore facilities that would be constructed.

Accidental events resulting from the CPA proposed action, including oil spills, have the potential to alter and degrade coastal waters through the increase of petroleum hydrocarbons and their various transformation/degradation products in the water.

Accidental events associated with the CPA proposed action that could impact coastal water quality include spills of oil and refined hydrocarbons, releases of natural gas, spills of chemicals or drilling fluids, loss of well control, pipeline failures, collisions, or other malfunctions that would result in such spills. In the case of an accidental event, it is likely that response efforts would reduce the amount of oil. Although response efforts may decrease the amount of oil in the environment, the response efforts may also impact

the environment. Increased vessel traffic, hydromodification (e.g., dredging, berm building, boom deployment, etc.), and the addition of dispersants and methanol to the marine environment in an effort to contain, mitigate, or clean up the oil may also tax the environment. **Chapter 3.2.1.9** provides further discussion of oil-spill response considerations. A major hurricane can affect OCS oil- and gas-related activities and result in a greater number of coastal oil and chemical spill events with increased spill volume and oil-spill response times.

In addition to response efforts, natural processes can physically, chemically, and biologically degrade oil over time. Offshore oil spills generally have more time for these natural degradation processes to occur before impacting the coastline, whereas spills that originate close to shore often impact beaches and marshes with no prior degradation. Also, spills in shallow water are more susceptible to incorporate sand and gravel in the oil, making it heavier and more likely to sink to the seafloor. Chemicals used in the oil and gas industry are not a significant risk in the event of a spill because they are either nontoxic, are used in minor quantities, or are only used on a noncontinuous basis. Spills from collisions are not expected to be significant because collisions occur infrequently and usually do not cause oil spills >1,000 bbl.

Cumulative Impacts

Coastal waters are vulnerable to impacts from OCS oil- and gas-related activities including erosion and runoff, sediment disturbance and turbidity, vessel discharges, and accidental releases of oil, gas, or chemicals. Increased turbidity and discharge from the CPA proposed action would be temporary in nature and minimized by regulations and mitigation. Since a catastrophic OCS Program-related accident would be rare and not expected to occur in coastal waters, the impact of accidental spills is expected to be small. A low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, is discussed in **Appendix B**.

Coastal waters are vulnerable to impacts from non-OCS oil- and gas-related activities or activities not related to the CPA proposed action or the OCS Program, including State oil and gas activities, alternative energy activities, alternate use programs for platforms (e.g., aquaculture), sand borrowing, the activities of other Federal agencies (including the military), natural events or processes, and activities related to the direct or indirect use of land and waterways by the human population. These activities may result in erosion and runoff, sediment disturbance and turbidity, hypoxia, vessel discharges, and accidental releases of oil, gas, or chemicals.

The impacts resulting from the CPA proposed action are a small addition to the cumulative impacts on the coastal waters of the Gulf of Mexico because non-OCS oil- and gas-related activities, including vessel traffic, erosion, and nonpoint source runoff, are cumulatively responsible for a majority of coastal water impacts. The incremental contribution of the routine activities and accidental events associated with the CPA proposed action to the cumulative impacts on coastal water quality is not expected to be significant for the reasons identified above.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

Various Internet sources were examined and literature searches conducted in order to assess the availability of new information regarding the water quality and sediment quality in coastal waters that may be pertinent to the CPA proposed action. The searches included, but were not limited to, Google, Google Scholar, and several USEPA websites. New information was found on the affected environment in relation to the Louisiana-Texas hypoxic zone in the Trustees' Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

In February 2016, the NRDA Trustees published the Final PDARP/PEIS. The document's findings repeated information previously discussed in Chapter 4.2.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.2.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS related to the extent of shoreline and coastal water exposure to oil from the *Deepwater Horizon* oil spill. The report indicated that, through wind, wave, and tidal action, oil was moved from the spill location and exposed at least 1,300 mi (2,092 km) of shoreline to oil. The Trustees reported that concentrations of oil found to cause toxicity were exceeded in surface waters, sediments, and marsh habitats at locations in the northern Gulf of

Mexico. They also indicated that the exceedances varied by location and declined substantially from 2010 to the time period when the report was completed (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). For more information about water and sediment sampling that was conducted during the *Deepwater Horizon* response, refer to Chapter 4.2.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

As discussed in Chapter 4.2.1.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS, nutrients carried in waters of the Louisiana and Texas rivers contribute to seasonal formation of a hypoxic zone on the Louisiana and Texas shelf. The Louisiana Universities Marine Consortium (LUMCON) generally predicts the seasonal maximum size of the Louisiana-Texas hypoxic zone based on nitrogen loading in the Mississippi River (as measured in May of each year), and the actual size reported is based on cruise data collected by LUMCON in July of each year. Recent estimates of the area of low oxygen by NOAA (USDOC, NOAA, 2015b) as of August 3, 2015, measured 6,474 square miles (mi^2) (16,760 square kilometers [km^2]) (**Figure 4-1**), an increase from the size measured in 2014 (5,052 mi^2; 13,085 km^2) and larger than the estimated size (5,838 mi^2; 15,120 km^2) forecast by Turner and Rabalais (2015) in June 2015. The Louisiana-Texas hypoxic zone is unrelated to OCS oil- and gas-related activities, but it is discussed here as a potential cumulative effect.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in this Supplemental EIS and in Chapter 4.2.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.2.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, BOEM has identified incomplete or unavailable information that may be relevant to reasonably foreseeable impacts on coastal water quality. BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. Given the available data on coastal sediments and water quality that have been released and evaluated, as described above and in Chapter 4.2.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and as noted in Chapter 4.1.1.2.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, BOEM believes that this incomplete or unavailable information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for coastal waters presented in the prior 2012-2017 WPA/CPA Multisale EIS based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for coastal waters presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.2.2. Offshore Waters

Offshore waters within the CPA, as defined by BOEM, include Louisiana, Mississippi, and Alabama offshore waters and Federal OCS waters, which includes everything outside any barrier islands to the Exclusive Economic Zone.

BOEM has reexamined the analysis for offshore water quality presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for offshore water quality presented in the prior 2012-2017 Gulf of Mexico EISs. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.2.2 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.2.2 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.2.2 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following

information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The routine activities associated with the CPA proposed action that would impact offshore water quality include the following:

- discharges during drilling of exploration and development wells;
- structure installation and removal;
- discharges during production;
- installation of pipelines;
- workovers of wells;
- maintenance dredging of existing navigational canals;
- service-vessel discharges; and
- nonpoint-source runoff from platforms and OCS Program-related vessels.

These routine activities and associated impact-producing factors are discussed in detail in the 2012-2017 WPA/CPA Multisale EIS. During exploratory activities, the primary impacting sources to offshore water quality are discharges of drilling fluids and cuttings. During platform installation and removal activities, the primary impacting sources to water quality are sediment disturbance and temporarily increased turbidity. Impacting discharges during production activities are produced water and supply-vessel discharges. Regulations are in place to limit the toxicity of the discharge components, the levels of incidental contaminants in these discharges, and, in some cases, the discharge rates and discharge locations. Pipeline installation can also affect water quality by sediment disturbance and increased turbidity. Service-vessel discharges might include water with an oil concentration of approximately 15 ppm as established by USEPA regulatory standards. Any disturbance of the seafloor would increase turbidity in the surrounding water, but the increased turbidity should be temporary and restricted to the area near the disturbance. There are multiple Federal regulations and permit requirements that would decrease the magnitude of these activities. Impacts to offshore waters from routine activities associated with the CPA proposed action should be minimal as long as regulatory requirements are followed.

Accidental events associated with the CPA proposed action that could impact offshore water quality include spills of oil and refined hydrocarbons, releases of natural gas and condensate, spills of chemicals or drilling fluids, loss of well control, pipeline failures, collisions, or other malfunctions that would result in such spills. Spills from collisions are not expected to be significant. Overall, the potential impacts to offshore water quality are not expected to be significant except in the rare case of a catastrophic event. Although response efforts may decrease the amount of oil in the environment, the response efforts may also impact the environment through, for example, increased vessel traffic and the application of dispersants. Natural degradation processes will also decrease the amount of spilled oil over time. Chemicals used in the oil and gas industry are not a significant risk for a spill because they are either nontoxic, are used in minor quantities, or are only used on a noncontinuous basis.

Cumulative Impacts

Offshore waters are vulnerable to impacts from cumulative OCS oil- and gas-related activities including erosion and runoff, sediment disturbance and turbidity, vessel discharges, discharges from exploration and production activities, and accidental releases of oil, gas, or chemicals. Routine activities that increase turbidity and discharges are temporary in nature and are regulated; therefore, these activities would not have a lasting adverse impact on water quality. In the case of a low-probability catastrophic event, degradation processes in both surface and subsurface waters would decrease the amount of spilled

oil over time through natural processes that can physically, chemically, and biologically degrade oil (NRC, 2003).

Offshore waters are also vulnerable to impacts from activities not related to the CPA proposed action or the OCS Program, including State oil and gas activities, alternative uses of platforms (e.g., aquaculture), sand borrowing, renewable energy activities, the activities of other Federal agencies (including the military), natural events or processes, and activities related to the direct or indirect use of land and waterways by the human population(e.g., urbanization, agricultural practices, coastal industry, and municipal wastes). These activities may result in erosion and runoff, sediment disturbance and turbidity, hypoxia, vessel discharges, natural releases of oil and gas (e.g., seeps), and accidental releases of oil, gas, or chemicals. Although some of these impacts are likely to affect coastal areas to a greater degree than offshore waters, coastal pollutants that are transported away from shore would also affect offshore environments.

The impacts resulting from the CPA proposed action are a small addition to the cumulative impacts on the offshore waters of the Gulf, when compared with inputs from natural hydrocarbon inputs (seeps), coastal factors (such as erosion and runoff), and other non-OCS oil- and gas-related industrial discharges. The incremental contribution of the routine activities and accidental discharges associated with the CPA proposed action to the cumulative impacts on offshore water quality is not expected to be significant.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

Various Internet sources were examined and literature searches conducted in order to assess the availability of new information regarding the water quality and sediment quality in offshore waters that may be pertinent to the CPA proposed action. The searches included, but were not limited to, Google, Google Scholar, and several USEPA websites. New information was found on the affected environment in relation to the Louisiana-Texas hypoxic zone and historic non-OCS oil- and gas-related activities that constitute a potential cumulative impact on the offshore environment in the Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). In February 2016, the NRDA Trustees published the Final PDARP/PEIS in accordance with the Oil Pollution Act of 1990 and NEPA.

As part of the NRDA process, over 100,000 samples of water, tissue, oil, and sediment were collected and stored in DIVER (USDOC, NOAA, 2016). Some of the findings of the Final PDARP/PEIS include the following:

- oil slicks cumulatively covered over 112,115 km^2 (43,288 mi^2) of the ocean surface (USDOC, NOAA, 2015c), and oil contamination was documented on over 2,100 km (1,305 mi) of shorelines;
- *Deepwater Horizon* oil covered at least 1,030 km^2 (398 mi^2) of deep-sea habitat, with seafloor impacts from *Deepwater Horizon* oil extending beyond this zone;
- more than 400 flights sprayed chemical dispersants on surface oil slicks and more than 400 fires were set on the sea surface to burn slicks;
- oil, dispersants, and drilling mud introduced in response to the oil spill traveled through the deep sea, some of which was deposited on the seafloor; and
- the estimated 7.7 billion standard cubic feet of natural gas released along with oil from the well remained in the deep sea and was likely consumed by microbes. The microbes, as well as oily particulate matter and burn residues near the sea surface, sank to the seafloor in a so-called “dirty blizzard” of oily marine snow particles that was deposited on the seafloor as brown flocculent material (“floc”).

Most of this information with respect to water quality is consistent with material previously published in Chapter 4.2.1.2.2 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.2.2 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226

Supplemental EIS. However, the description of the process causing oily marine snow particles to be deposited on the seafloor is new in this analysis. The Final PDARP/PEIS also presents updated maps showing the extent of the surface oil slick and area of seafloor impacts; these maps are considered the best-available visualizations of these impacts.

As discussed in Chapter 4.2.1.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS, nutrients carried in waters of the Louisiana and Texas rivers contribute to seasonal formation of a hypoxic zone on the Louisiana and Texas shelf. The LUMCON generally predicts the seasonal maximum size of the Louisiana-Texas hypoxic zone based on nitrogen loading in the Mississippi River (as measured in May of each year), and the actual size reported is based on cruise data collected by LUMCON in July of each year. Recent estimates of the area of low oxygen by NOAA (USDOC, NOAA, 2015b) as of August 3, 2015, measured 6,474 mi^2 (16,760 km^2) (**Figure 4-1**), an increase from the size measured in 2014 (5,052 mi^2; 13,085 km^2) and larger than the estimated size (5,838 mi^2; 15,120 km^2) forecast by Turner and Rabalais (2015) in June 2015. The Louisiana-Texas hypoxic zone is unrelated to OCS oil-and gas-related activities, but it is discussed here as a potential cumulative effect.

Between 1940 and 1970, certain offshore locations of the United States were used for the disposal of various industrial wastes and low-level radioactive wastes; these activities were large, unrecorded, and unregulated (USDOC, NOAA, 2015d).

The Marine Protection, Research, and Sanctuaries Act of 1972 (also known as the Ocean Dumping Act) was promulgated to regulate ocean dumping and set aside certain areas as national marine sanctuaries. Section 101 (33 U.S.C. § 1411) of the Act prohibited ocean dumping, except as authorized by permit issued by the USEPA pursuant to Section 102 (33 U.S.C. § 1412).

In 1973, the USEPA permitted, through Section 102 (33 U.S.C. § 1412), two interim chemical disposal sites in the Gulf of Mexico, the charting of which has been maintained by NOAA. Disposal Site A, located within the WPA, is situated on the upper part of the Texas-Louisiana continental shelf, approximately 125 mi (201 km) southwest of Galveston, Texas. Disposal Site B is located in the CPA off the western side of the Mississippi Delta, approximately 60 mi (7 km) south of the mouth of the Mississippi River.

BOEM recently became aware of the report, *Assessing Potential Ocean Pollutants*, which was published by the National Academy of Sciences (National Research Council, 1975). This report provided a new understanding of the disposal site conditions.

At Site A, uncontained wastes were discharged through a submerged pipe into the turbulent wake of a barge. At Site B, waste materials were placed in barrels before discharge. Chemical wastes discharged at these sites reportedly had various concentrations of chlorinated hydrocarbons, calcium and sodium metals, formaldehyde, cyanide, and other metals (i.e., antimony, mercury, arsenic, zinc, manganese, and iron). Seven permits issued by the USEPA beginning in May 1973 allowed for the disposal of 84,500 tons of uncontained waste at Site A and 208,500 waste barrels at Site B, of which approximately 55,000 bbl contained chlorinated hydrocarbons.

Site B is discussed in the Information to Lessees and Operators (ITL), "Central Planning Area, Oil and Gas Lease Sale 213, Section (t), Commercial Waste Disposal Areas" (February 12, 2010). In the ITL, lessees are advised that the blocks associated with the disposal site and the adjacent blocks associated with the disposal site that were included in CPA Lease Sale 213 should be considered potentially hazardous. Drilling and platform/pipeline placement may require precautions such as avoidance upon identification and any other appropriate precautions. No such ITL currently exists for Site A.

These chemical waste disposal sites are pertinent to this impact analysis because they constitute a potential cumulative effect on offshore water and sediment quality, and they may expose benthic organisms to contaminants. Some of the constituents listed in the National Academy of Sciences' report are carcinogenic, and others may bioaccumulate in marine ecosystems. To date, the barrels dumped at Site B in 1973 have been under water for 42 years and may have started to release their contents. As such, the potential impacts from Sites A and B must be considered in marine environmental assessments of the Gulf of Mexico.

This new information indicates that some of the wastes disposed of on the OCS may have a greater environmental impact than offshore OCS oil- and gas-related activity. Chlorinated hydrocarbons are more dense than seawater and may sink into sediments if released from the waste barrels. These compounds may also dissolve in water and will form a persistent, localized contaminant plume in the water column as long as the source remains. In contrast, petroleum hydrocarbon compounds originating

from OCS oil- and gas- related activities are considered degradable and do not persist in the water column after the source is removed.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in this Supplemental EIS and in Chapter 4.2.1.2.2 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.2.2 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, BOEM has identified incomplete or unavailable information that may be relevant to reasonably foreseeable impacts on offshore water quality.

BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions. Given the available data on offshore sediments and water quality that have been released and evaluated most recently in Chapter 4.1.1.2.2 of the CPA 241/247 and EPA 226 Supplemental EIS, as well as in Chapter 4.2.1.2.2 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.2.2 of the CPA 235/241/247 Supplemental EIS, BOEM believes that this incomplete or unavailable information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for offshore waters presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for offshore waters presented those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts detailed and updated in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.3. Coastal Barrier Beaches and Associated Dunes

BOEM has reexamined the analysis for coastal barrier beaches and associated dunes presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for coastal barrier beaches and associated dunes presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.3 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.3 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.3 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. Additional information about the Gulf Islands National Seashore is presented in **Chapter 4.1.1.21** of this Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors of the CPA proposed action on coastal barrier beaches and associated dunes include pipeline emplacements, use of navigation channels by vessel traffic, dredging, and the use and construction of support infrastructure. Effects to coastal barrier beaches and associated dunes from pipeline emplacements, navigation channel use and dredging, and construction or continued use of infrastructure in support of the CPA proposed action are expected to be restricted to temporary and localized disturbances. The expected 0-1 pipeline landfalls projected in support of the CPA proposed action are not expected to cause significant impacts to barrier beaches because of the use of nonintrusive installation methods and other requirements imposed through Federal and State regulatory programs and permitting processes. Impacts could be reduced or eliminated through modern techniques

such as horizontal, directional (trenchless) drilling to avoid damages to these sensitive wetland habitats. Any new processing facilities would not be expected to be constructed on barrier beaches. The CPA proposed action may contribute to the continued use of gas processing facilities that already exist. Existing pipelines, in particular those that are parallel and landward of beaches and that had been placed on barrier islands using older techniques that left canals or shore protection structures, have caused and could continue to cause barrier beaches to narrow and breach. Pipelines associated with CPA development proposing to cross the Gulf Islands National Seashore must be approved by the Secretary of the Interior and are subject to appropriate regulations for the protection of the natural and recreational values for which the Gulf Islands National Seashore was established (16 U.S.C. § 459(h)(3)).

Maintenance dredging of barrier inlets and bar channels is expected to occur, which, when combined with channel jetties, generally causes impacts on adjacent barrier beaches downdrift of the channel by removing sediment from the system. Dredging activities in these channels are permitted, regulated, and coordinated by the COE with the appropriate State and Federal resource agencies. Impacts from these operations are reduced by requirements for the beneficial use of the dredged material for wetland and beach construction and restoration. Permit requirements further mitigate dredged material placement in approved disposal areas by requiring the dredged material to be placed in such a manner that it neither disrupts hydrology nor changes elevation in the surrounding marsh. Because these impacts occur whether the CPA proposed action is implemented or not, the CPA proposed action would account for a small percentage of these impacts.

Routine activities associated with the CPA proposed action are not expected to adversely alter barrier beach configurations much beyond existing, ongoing impacts in localized areas downdrift of artificially jettied and maintained channels. Strategic placement of dredged material from channel maintenance, channel deepening, and related actions can mitigate adverse impacts upon those localized areas.

Accidental disturbances resulting from the CPA proposed action, including oil spills, have the potential to impact coastal barrier beaches and associated dunes of the CPA. The main accidental impact-producing factors that would affect coastal barrier beaches and associated dunes are oil spills and cleanup activities.

The potential impacts from oil spills to barrier islands seaward of the barrier-dune system are discussed below, while the potential impacts from spills that occur landward of the barrier-dune system are considered in the wetlands analysis (refer to **Chapter 4.1.1.4**). Due to the proximity of coastal spills to barrier islands and beaches, coastal spills pose the greatest threat because of their concentration and lack of weathering by the time they hit the shore and because dispersants are not used in coastal waters due to the negative effects on the shallow-water coastal habitats. Such spills may result from either vessel collisions that release fuel and lubricants or from pipelines that rupture. Impacts of a nearshore spill would likely be considered short term in duration and minor in scope because the size of such a spill is projected to be small. When limited to just oil- and gas-related spill sources such as platforms, pipelines, MODUs, and support vessels, Louisiana, Texas, Mississippi, and Alabama could have a total of 130-170, 5-10, 3-5, and about 2 spills <1,000 bbl/yr, respectively. Louisiana and Texas are the states most likely to have a spill ≥1,000 bbl occur in coastal waters (refer to Chapter 3.2.1.7.1 of the 2012-2017 WPA/CPA Multisale EIS). The distribution of spill sizes is likely to be similar to those identified in Anderson et al. (2012) for OCS spills. Ninety-six percent of spills are <1 bbl (average size = 0.05 bbl) and 98 percent of spills are <10 bbl (average size for spills 1-9 bbl = 3 bbl). For more information on spill sizes, refer to Chapter 3.2.1.7.1 of the 2012-2017 WPA/CPA Multisale EIS.

For offshore spills, the spill may be larger but the oil would likely be lessened in toxicity when it reaches the coastal environments due to the distance from shore, increased weathering, and the possible use of dispersant. Equipment and personnel used in cleanup efforts can generate the greatest direct impacts to an area, such as the disturbance of beach and foredune sands through foot traffic and mechanized cleanup equipment (e.g., sifters), dispersal of oil deeper into sands and sediments, and foot traffic in marshes impacting the distribution of oils and marsh vegetation. Close monitoring and restrictions on the use of bottom-disturbing equipment would be needed to avoid or minimize those impacts. The cleanup impacts of these spills could result in a short-term (up to 2 years) adjustment in beach profiles and configurations during cleanup operations. Beach profiles could be altered in various ways when oil is removed from beaches: by hand, using tools such as shovels and rakes; and by heavy equipment such as backhoes and graders. Holes may be dug to remove tarballs, and beaches may be graded, changing the shape of the beaches. Sand may be lost from the beach as it is removed along with oil and tar. Crab burrows and other habitat may be altered, and park visitors may observe an altered

landscape compared with the natural beach observed previously. Some impact as a result of physical contact to lower areas of sand dunes is expected. These contacts would not result in significant destabilization of the dunes. The long-term stressors to barrier beach communities caused by the physical effects and chemical toxicity of an oil spill may lead to decreased primary production, plant dieback, and further erosion, particularly if oil is carried onto dunes by hurricanes.

Currently available information suggests that impacts on barrier islands and beaches from accidental impacts associated with the CPA proposed action would be minor. Should a spill other than a low-probability catastrophic spill, which is not part of the proposed action and not likely expected to occur, contact a barrier beach, oiling is expected to be light and sand removal during cleanup activities minimized. No significant long-term impacts to the physical shape and structure of barrier beaches and associated dunes are expected to occur as a result of the CPA proposed action. Therefore, the CPA proposed action would not pose a significant increase in risk to barrier island or beach resources.

Cumulative Impacts

The OCS oil- and gas-related, impact-producing factors that could have cumulative impacts on coastal barrier beaches and associated dunes include dredging, construction and expansion of navigational canals and port facilities, pipeline emplacement/landfalls, vessel traffic, oil spills, and oil-spill response and cleanup activities. Under the cumulative scenario, up to one OCS oil- and gas-related pipeline landfall is projected. This pipeline is expected to be installed using modern techniques, which cause little to no impacts to the barrier islands and beaches. Impacts from existing infrastructure could continue to cause barrier beaches to narrow and breach. The impacts of oil spills from OCS oil- and gas-related sources to the Louisiana, Mississippi, and Alabama coast should not result in long-term alteration of landforms if the beaches are cleaned using techniques that do not significantly remove sand from the beach or dunes. Barrier beaches in the region around Lafourche, Cameron, Plaquemines, and St. Bernard Parishes in Louisiana have the greatest risks of sustaining impacts from oil-spill landfalls because of the high concentrations of oil production near that coast and the high volume of oil transported by ships in that area. Oil spills as a result of a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, are discussed in **Appendix B**.

Non-OCS oil- and gas-related impacts include non-OCS oil- and gas-related vessel traffic, maintenance dredging, beach protection and stabilization projects, sea-level rise, subsidence, development and urbanization, tourism, recreational activities, and the potential for nearshore salinity modifications (such as preparation of salt domes for oil storage). In addition, oil spills and oil-spill response and cleanup activities can originate from non-OCS oil- and gas-related activities, i.e., State oil and gas activity and international tankers. River channelization, sediment deprivation, tropical and extra-tropical storm activity, sea-level rise, and rapid submergence have resulted in erosion of most of the barrier and shoreline landforms along the Louisiana coast. Storm-induced changes in hydrology have, in some cases, changed the current regime responsible for stabilizing the barrier islands. Some beach stabilization projects are considered by coastal geomorphologists and engineers to accelerate coastal erosion. The beneficial use of maintenance dredged materials and other restoration techniques could be required to mitigate some of these impacts. Recreational use of some barrier beaches in the CPA is intense due to their accessibility by roads. These activities can cause changes to the beach landscapes. There are ongoing restoration efforts to minimize damages to beaches from both natural and human impacts.

Coastal barrier beaches have experienced severe adverse cumulative impacts from natural processes and human activities. Natural processes are generally considered the major contributor to these impacts, whereas human activities cause severe local impacts and accelerate the natural processes that deteriorate coastal barriers. Human activities that have caused the greatest adverse impacts are river channelization and damming, pipeline canals, navigation channel stabilization and maintenance, and beach stabilization structures. Deterioration of Gulf barrier beaches is expected to continue in the future. Federal, State, and county/parish governments have made efforts to restore or protect the sensitive and vulnerable barrier islands and mainland beaches (Dixon and Pilkey, 1991; Penland et al., 2003).

The CPA proposed action is not expected to adversely alter barrier beach configurations significantly. The CPA proposed action is not expected to increase the probabilities of oil spills beyond the current estimates. Strategic placement of dredged material from channel maintenance, channel deepening, and related actions can mitigate adverse impacts upon those localized areas. Compared with other impacting

factors on coastal barrier beaches and dunes, the incremental contribution of the CPA proposed action to the cumulative impacts to these resources is expected to be small.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search was conducted for information published on barrier beaches and dunes, and various Internet sources were examined to determine any recent information regarding barrier beaches and dunes. Sources investigated include BOEM; the U.S. Department of the Interior, Geological Survey (USGS), National Wetlands Research Center; the USGS Gulf of Mexico Integrated Science Data Information Management System; Gulf of Mexico Alliance; State environmental agencies; USEPA; and coastal universities. Other websites from scientific publication databases (including Science Direct, Elsevier, the NOAA Central Library National Oceanographic Data Center, and JSTOR) were checked for new information using general Internet searches based on major themes. Most new and pertinent information has been the result of *Deepwater Horizon*-related research, and these studies have provided insight into many aspects of the spill and its effects as it relates to beach and dune environments.

Hayworth et al (2015) found that oil from the *Deepwater Horizon* explosion and oil spill remained in Alabama's beach system as surface residual balls and submerged oil mats 4 years after the spill. This study serves to expand our understanding of the baseline environment following the *Deepwater Horizon* explosion, oil spill, and response. It also provides information about the continuing impacts in the years following oil contamination of beaches.

In the Final PDARP/PEIS, the NRDA Trustees documented negative impacts to a wide range of coastal habitats, including sand beaches, as a result of the *Deepwater Horizon* oil spill (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). They found that 965 km (600 mi) of sand beach and dune habitat along shorelines and back-barrier islands across the northern Gulf of Mexico were injured as a result of the *Deepwater Horizon* oil spill, and the injuries resulted from a combination of the direct effects of oil and ancillary adverse impacts of response activities undertaken to clean up the oil (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

Another recent study has investigated the impacts of non-OCS oil- and gas-related activity. Houser et al. (2015) studied barrier island resilience and found that, while erosion of beaches and dunes during powerful storms occurs over hours and days, it can be years to decades before the beach and dune are able to recover to their pre-storm state. This study helps to provide a context for the threats to beaches from sources other than OCS oil- and gas-related activities.

While the recent research has provided new information regarding impacts to coastal beaches and dunes from oil spills, this new information does not change the conclusions presented in the prior 2012-2017 Gulf of Mexico EISs because such a low-probability catastrophic event is unlikely to occur and because BOEM has already considered the potential irreversible effects to coastal beaches and dunes in **Appendix B**.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions presented in the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in the prior 2012-2017 Gulf of Mexico EISs, BOEM has identified incomplete or unavailable information regarding impacts to coastal barrier beaches and associated dunes in the CPA as a result of the *Deepwater Horizon* explosion, oil spill, and response, as well as future restoration efforts and rates of sea-level rise.

This incomplete or unavailable information may be relevant to reasonably foreseeable significant adverse effects because recent events such as the *Deepwater Horizon* explosion, oil spill, and response may have caused changes to baseline conditions for coastal beaches and associated dunes of the Gulf of Mexico. This information cannot reasonably be obtained because the long-term effects may not yet be detectable and the overall costs in time and money to determine this are exorbitant. A large body of information regarding impacts of the *Deepwater Horizon* explosion, oil spill, and response upon coastal barrier beaches and associated dunes is being developed through the NRDA process, but much of it is not yet available. BOEM used existing information and reasonably accepted scientific methodologies to

extrapolate from existing information in completing this analysis and formulating the conclusions presented here. For example, the following studies were analyzed with regards to coastal barrier beaches and dunes: The National Research Council (2013); Daylander et al. (2014); and Hayworth et al. (2015). The National Research Council (2013) found that natural populations of deep-sea, oil-degrading bacteria digested a significant amount of the oil, reducing the amount of oil contacting beaches. They also found that the effectiveness of berms and freshwater diversions for nearshore and onshore protection of shorelines was negligible. Daylander et al. (2014) and Hayworth et al. (2015) provided additional information about weathering and the mobility of tarballs on and adjacent to the oiled beaches. The results of these recent studies of coastal barrier beaches and dunes indicate that the extent of impacts resulting from a low-probability catastrophic oil spill could be extensive but that the oil would be degraded over time. However, a low-probability catastrophic oil spill is not much more likely with the proposed CPA lease sale than without, given the existing level of OCS oil- and gas-related activities and the small incremental increase in the activity that is expected from the proposed CPA lease sale. Therefore, none of these sources reveal reasonably foreseeable significantly greater adverse impacts, whether or not the No Action or an Action alternative is chosen under this Supplemental EIS.

There are also unknowns regarding the future restoration efforts being planned, such as what projects will ultimately be constructed and how successful they may be. This information will not be available until such projects are constructed, which is not within the timeline contemplated in the NEPA analysis of this Supplemental EIS. However, BOEM used existing information regarding the effects of past projects, the plans for restoration projects currently being considered under the RESTORE Act, and past effects of coastal development on coastal beaches to anticipate the benefit of restoration projects in the CPA (Gulf Coast Ecosystem Restoration Council, 2014; State of Louisiana, Coastal Protection and Restoration Authority, 2014; State of Mississippi, Dept. of Environmental Quality, 2014; Alabama Gulf Coast Recovery Council, 2014; State of Florida, Dept. of Environmental Protection, 2014). BOEM has determined that the scope of the planned restoration projects would likely only partially restore what was present historically along the Gulf Coast, although any restoration of coastal barrier beaches and associated dunes would likely reduce the land loss rates. However, BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives because BOEM can extrapolate the effects of the CPA proposed action based on the effects of past lease sales on earlier baselines.

In addition, the future rates of relative sea-level rise are not known with certainty (Intergovernmental Panel on Climate Change, 2014), and thus, the resulting impacts to coastal barrier beaches and associated dunes are unknown. BOEM has used studies of the effects of sea-level rise on beach habitat (Hinkel et al., 2013; Chu et al., 2014), as well as a study that used a likely range of projections of sea-level rise (Glick et al., 2013) to assess the likely impacts of sea-level rise to the baseline environment. BOEM used this existing information to determine possible impacts of a natural non-OCS oil- and gas-related activity on an altered coast and to compare it with the possible impacts of the CPA proposed action. BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives because BOEM can extrapolate the effects of the CPA proposed action on expected reduced future acreages of wetlands based on the effects of past lease sales on earlier baselines.

BOEM has determined that the incomplete or unavailable information is not essential to a reasoned choice among alternatives because the CPA is an active oil and gas region with ongoing exploration, drilling, and production activities. In addition, non-OCS energy-related factors will continue to occur in the CPA irrespective of the CPA proposed action (i.e., development, urbanization, recreational activities, etc.). The potential for effects from changes to the affected environment (post-*Deepwater Horizon*), routine activities, accidental spills (including low-probability catastrophic spills), and cumulative impacts remains whether or not the No Action or an Action alternative is chosen under this Supplemental EIS. Impacts on coastal barrier beaches and associated dunes from either smaller accidental events or low-probability catastrophic spills would remain the same.

Summary and Conclusion

BOEM has reexamined the analysis for coastal barrier beaches and associated dunes presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. The information discovered does not alter the impact conclusion for coastal barrier beaches and associated

dunes presented in the prior 2012-2017 Gulf of Mexico EISs. The analysis and potential impacts detailed and updated in those NEPA documents still apply for proposed CPA Lease Sale 247.

4.1.1.4. Wetlands

BOEM has reexamined the analysis for wetlands presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for wetlands presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.4 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.4 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors on wetlands along the coast adjacent to the CPA include pipeline emplacement, construction, and maintenance; navigation channel use (vessel traffic) and maintenance dredging; disposal of OCS oil- and gas-related wastes; and use and construction of support infrastructure in coastal areas. Other potential impacts that are indirectly associated with OCS oil- and gas-related activities are wake erosion resulting from navigational traffic; levee construction that prevents necessary sedimentary processes; saltwater intrusion that changes the hydrology, leading to unfavorable conditions for wetland vegetation; and vulnerability to storm damage from eroded wetlands. It is expected that impacts of pipelines would be reduced or eliminated through mitigation, such as horizontal, directional (trenchless) drilling techniques to avoid damages to these sensitive wetland habitats. Although maintenance dredging of navigation channels and canals in the CPA is expected to occur, the CPA proposed action is expected to contribute minimally to the need for this dredging. Alternative dredged-material disposal methods can be used to enhance and create wetlands. Secondary impacts to wetlands from the CPA proposed action would result from OCS oil- and gas-related vessel traffic, contributing to the erosion and widening of navigation channels and canals. Overall, the impacts to wetlands from routine activities associated with the CPA proposed action are expected to be low due to the small length of projected onshore pipelines, the minimal contribution to the need for maintenance dredging, and the mitigating measures that would be used to further reduce these impacts.

Accidental disturbances resulting from the CPA proposed action, mainly oil spills, have the potential to cause plant mortality and permanent loss of wetlands of the CPA. Offshore oil spills resulting from the CPA proposed action would have a low probability of contacting and damaging wetlands along the Gulf Coast, except in the case of a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur (refer to **Appendix B**). This is because of the distance of the spill to the coast, the likely weathered condition of oil (through evaporation, dilution, and biodegradation) should it reach the coast, and because wetlands are generally protected by barrier islands, peninsulas, sand spits, and in some cases by currents. However, because the protective capacity of barrier islands has been reduced due to land lost in hurricanes and anthropogenic factors, there is a greater potential for the oiling of coastal wetlands during an accidental event. The causes of coastal and offshore oil spills are summarized in **Chapters 3.1.1.7 and 3.3.5.2**. Although the probability of occurrence is low, the greatest threat from an oil spill to wetland habitat is from a spill as a result of an inland or nearshore vessel accident or pipeline rupture. Wetlands in the northern Gulf of Mexico are in moderate- to high-energy environments; therefore, sediment transport and tidal stirring should reduce the chances for oil persisting in the event that these areas are oiled. While a resulting slick may cause impacts to wetland habitat and associated seagrass communities, the equipment, chemical treatments, and personnel used for cleanup can generate the greatest impacts to the area. Associated foot traffic may work oil farther into the sediment than would otherwise occur. Close monitoring and restrictions on the use of bottom-disturbing equipment would be needed to avoid or minimize those impacts. In addition, an assessment of the area covered, oil

type, and plant composition of the wetland oiled should be made prior to choosing remediation treatments. These treatments could include mechanical and chemical techniques with onsite technicians. Overall, impacts to wetland habitats from an oil spill associated with activities related to the CPA proposed action would be expected to be low and temporary because of the small contribution of the CPA proposed action to the total OCS activity, the distance of most of the activity from shore, the weathering of spilled oil, and the ability of vegetation to recover from exposure to crude oil (Khanna et al., 2013).

Cumulative Impacts

The cumulative analysis considers the effects of impact-producing factors related to the CPA proposed action, prior and future OCS lease sales in the Gulf of Mexico, and non-OCS oil- and gas-related activities such as State oil and gas activities, other governmental and private projects and activities, and natural processes that may affect wetlands. Several OCS oil- and gas-related cumulative impact-producing factors could potentially impact wetland resources, including oil spills and cleanup activity, OCS oil- and gas-related vessel traffic, construction of OCS oil- and gas-related infrastructure and support structure (including pipelines), and waste disposal.

The primary impact-producing factors attributable to the CPA proposed action are pipeline landfalls, canal widening, and maintenance dredging of navigation canals because they can result in land loss. However, modern construction techniques and regulations reduce impacts to wetlands as a result of these activities. In addition, because the increase in pipelines, dredging, and vessel traffic from the CPA proposed action are predicted to be minimal, impacts related to these factors are also expected to be minimal. The possibility of physical oiling of wetlands from the CPA proposed action as a result of an oil spill originating in OCS waters is minimal compared with an oil spill that is closer to the wetlands and that could occur in State waters or in rivers, bays, or estuaries. The effects from a spill have the highest probability of occurring in Lafourche, Cameron, Plaquemines, and St. Bernard Parishes in Louisiana. These are the primary areas where oil produced in the CPA is transported and distributed. If any oil spills occur in rivers, bays, or estuaries from pipelines or vessels, they will likely be small and at service bases or other support facilities, and these small-scale local spills would not be expected to severely affect wetlands. Accidental spills as a result of a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, may have impacts on wetlands. Low-probability catastrophic events are discussed in **Appendix B**.

Non-OCS oil- and gas-related cumulative impact-producing factors that could potentially impact wetland resources include State oil and gas activities, non-OCS oil- and gas-related vessel traffic, coastal infrastructure and development, maintenance of navigation canals, natural processes (including hurricane and tropical storms), and sea-level rise. Between 2004 and 2009, the Gulf of Mexico coastal region lost a net amount of 257,150 ac (104,065 ha) of wetlands (Dahl and Stedman, 2013). Dahl and Stedman (2013) reported that saltwater wetland losses in the Gulf of Mexico have been attributed to the effects of severe coastal storms such as Hurricanes Katrina and Rita in 2005 and Hurricane Ike in 2008, which inundated wetlands with storm surge, abnormally high tides, increased rainfall, runoff, increased sediment and debris deposition, and erosion. By comparison, a small percentage of saltwater wetland losses have been traced to discrete anthropogenic actions in the Gulf of Mexico (Dahl and Stedman, 2013). Non-OCS oil- and gas-related impacts from residential, commercial, agricultural, and silvicultural (forest expansion) developments are expected to continue in coastal regions around the Gulf of Mexico. Wetlands are most vulnerable to oil spills that may occur in coastal waters, the impacts of which would be primarily localized in nature. Many such spills are from non-OCS oil- and gas-related sources, such as State oil and gas activities, which can include vessel collisions, pipeline breaks, and shore-based transfer, refining, and production facilities. Insignificant adverse impacts on wetlands from maintenance dredging are expected because the large majority of the material would be placed in existing disposal areas or used beneficially for marsh restoration or creation. Hurricanes and tropical storms can cause extensive damage to wetlands, including conversion of large acreages of wetlands to open water. Marine vegetation deposited by storms can rest on wetland plants, resulting in mortality. One benefit of storms is that they can be capable of delivering sediment from offshore or interior bays into wetland areas, partially offsetting erosion. Sea-level rise can impact coastal wetlands by the drowning of plants. Relative sea-level rise, which includes local factors such as subsidence, can increase salinity and flooding, resulting in reduced productivity of wetland plants (Spalding and Hester, 2007).

Development pressures in the coastal regions of Louisiana, Mississippi, Alabama, and Florida have caused the destruction of large areas of wetlands. In coastal Louisiana, the most destructive developments have been the inland oil and gas industry projects, which have resulted in the dredging of huge numbers of access channels. Agricultural, residential, and commercial developments have caused the most destruction of wetlands in Mississippi, Alabama, and Florida. In Florida, recreational and tourist developments have been particularly destructive. Groundwater extraction, vessel traffic, the drainage of wetland soils, and the construction of buildings, roads, and levees have also caused the loss of wetlands. The cumulative effects of human and natural activities in the coastal area have severely degraded the deltaic processes and have shifted the coastal area from a condition of net land building to one of net land loss. Therefore, wetland loss is expected to continue. Impacts are, to some extent, offset by coastal restoration programs. Examples of these programs are the Coastal Impact Assistance Program; the Coastal Wetlands Planning, Protection, and Restoration Act; and the RESTORE Act (refer to **Chapter 3.3.4.4** of this Supplemental EIS and Chapter 3.3.4.4 of the 2012-2017 WPA/CPA Multisale EIS). The CPA proposed action represents a small (<5%) portion of the OCS oil- and gas-related impacts that will occur over the 40-year analysis period. Impacts associated with the CPA proposed action are a minimal part of the overall OCS oil- and gas-related impacts. The incremental contribution of the CPA proposed action to the cumulative impacts to coastal wetlands is minimal compared with the impacts associated with non-OCS oil- and gas-related activities in the Gulf of Mexico.

New Information Available Since the Publication of 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search was conducted for information published on northern Gulf of Mexico wetland communities, and various Internet sources were examined to determine any recent information regarding these communities. Sources investigated include BOEM, the USGS National Wetlands Research Center, the USGS Gulf of Mexico Integrated Science Data Information Management System, Gulf of Mexico Alliance, State environmental agencies, USEPA, and coastal universities. Other websites from scientific publication databases (including ScienceDirect, Elsevier, the NOAA Central Library National Oceanographic Data Center, and JSTOR) were checked for new information using general Internet searches based on major themes.

Numerous studies have been published regarding impacts of the *Deepwater Horizon* explosion, oil spill, and response. In a study of the side effects of the response, Middleton et al. (2015) found that, after the Davis Pond freshwater diversion project was operated at capacity for almost 4 months in an effort to keep offshore oil from threatened coastal wetlands, above-ground litter production by swamp plants increased by 2.7 times of levels in 2007-2011 and the biomass of several species increased. Zengel et al. (2015) compared the effectiveness of several shoreline cleanup treatments in heavily oiled salt marsh. They found that, of the methods used, manual treatment (conducted by small crews using hand tools to remove oil and oiled debris) appeared to strike the right balance between improving oiling and habitat conditions while not causing additional detrimental effects. They further found that planting following treatment increased recovery of the marsh. Andersen (2015) reviewed numerous studies of the oil spill's impact and noted that aerial imagery was capable of detecting impacts penetrating up to 40 m (131 ft) into wetlands from shorelines, while ground-based visual observations were only able to confirm shoreline oiling and penetration into adjacent marshes of much lower distances. He also noted that, although wetland plants were negatively impacted by the oil, many of the affected areas are likely capable of rapid regeneration. Biber et al. (2015) found that salt marshes affected by oil along exposed, high-energy coastlines experienced more rapid removal or degradation of the oil contamination by tidal or wave action, with more rapid plant recovery. In contrast, in protected lagoonal shorelines, oil contamination tends to persist in the sediments, with a longer recovery of plants.

Other studies used mesocosms to examine the responses of wetland soil to oil and dispersants. Shi and Yu (2014) exposed marsh sediment to crude oil, with and without the dispersant COREXIT EC 9500A. They found that the dispersant decreased denitrification but stimulated organic matter mineralization. This result suggests that the loss of organic matter from the marsh could threaten its stability, and the more reducing conditions observed would tend to preserve the oil in the ecosystem for a longer time by decreasing its degradation. Batubara et al. (2014) exposed wetland soil to phenanthrene, comparing degradation rates at intertidal and subtidal simulations. They found that degradation occurred

more rapidly in the intertidal setting, mirroring earlier field experiments (on beaches) by others (Elango et al., 2014; Lemelle, 2012). These studies can be used to better understand the possible impacts to marshes following an oiling event.

In the Final PDARP/PEIS, the NRDA Trustees documented reduced vegetative cover and vegetated (aboveground) biomass, and an increase in marsh edge erosion as a result of the spill (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The *Deepwater Horizon* oil spill resulted in increased rates of coastal erosion, and erosion rates approximately doubled along at least 108 mi (174 km) of shoreline over at least 3 years. These results are similar to findings from the previous *Deepwater Horizon* studies summarized above.

The NRDA Trustees' Final PDARP/PEIS also documented injury to wetlands caused by the spill response, including the following:

- more than 497 mi (800 km) of boom were stranded in marshes, injuring vegetation and birds;
- removal of stranded boom also affected the wetlands, i.e., vegetation was crushed by airboats, walking boards, foot traffic, and by dragging the boom across the wetland surface; and
- the footprint of stranded boom totaled approximately 52 ac (210,000 m^2), which does not include the greater area of wetland swept by the boom when moved by storm waves.

Other recent research focused on issues other than oil-spill impacts. Pate (2014) used the geographic information system (GIS) analysis to investigate feasibility, cost, and benefits of canal backfilling as a restoration technique, in concert with approved projects in Louisiana's coastal marshes. He found that, using conservative estimates, over 26,000 ac (10,522 ha) could be backfilled at a significant savings using this approach. Hu et al. (2015) modeled the effect of wetlands on reducing storm surge in the Breton Sound Basin of Louisiana. Stem height and, to a lesser extent, stem density increased the maximum surge reduction and maximum surge reduction rate. The maximum surge reduction decreased significantly with increased wind intensity, and the maximum surge reduction rate was the highest with a fast-moving weak storm. This study provides insight into how much storm protection may be provided by coastal wetlands to vulnerable communities.

Kaiser (2015) forecasted offshore vessel activity and estimated between 53,000 and 119,000 trips per year from 2012 to 2017. Approximately half of the trips would emanate from Port Fourchon, Louisiana, and another 14 percent would emanate from Cameron, Louisiana. While this was not a study of wetlands, it helps to assess wetland impacts from routine activities by establishing that over 64 percent of the vessel traffic occurs in Louisiana.

While the recent research has provided much new information regarding impacts to wetlands from oil spills, this new information does not change the conclusions presented in the prior 2012-2017 Gulf of Mexico EISs because a catastrophic event is unlikely to occur and because BOEM has already considered the potential irreversible effects to wetlands, such as erosion and permanent loss, in **Appendix B** (**Chapter B.3.1.4**).

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As identified in the resource analyses in this Supplemental EIS, as well as in the prior 2012-2017 Gulf of Mexico EISs, BOEM has identified incomplete or unavailable information regarding wetlands in the CPA. This incomplete or unavailable information may be relevant to reasonably foreseeable significant adverse effects because recent events such as the *Deepwater Horizon* explosion, oil spill, and response may have caused changes to baseline conditions for coastal wetlands of the Gulf of Mexico. A large body of information regarding impacts of the *Deepwater Horizon* explosion, oil spill, and response upon coastal wetlands is being developed through the NRDA process, but much of this information is not yet available. Other unknowns are future benefits from restoration projects and future impacts of sea-level rise.

BOEM has determined that the information is not essential to a reasoned choice among alternatives because the CPA is an active oil and gas region with ongoing exploration, drilling, and production activities. In addition, non-OCS energy-related factors will continue to occur in the CPA irrespective of the CPA proposed action (i.e., commercial development, subsidence, hurricanes, etc.). The potential for effects from changes to the affected environment (post-*Deepwater Horizon*), routine activities, accidental event (including low-probability catastrophic spills), and cumulative impacts remains whether or not the No Action or an Action alternative is chosen under this Supplemental EIS. Impacts on wetlands from either smaller accidental events or low-probability catastrophic events will remain the same.

BOEM used existing information and reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. For example, the following studies were analyzed with regards to wetlands: Middleton et al. (2015); Zengel et al. (2015); Andersen (2015); Biber et al. (2015); Shi and Yu (2014); and Batubara et al. (2014). The results of these recent studies of wetlands indicate that the extent of impacts resulting from a catastrophic oil spill could be extensive but that the oil would be degraded over time. While marsh vegetation can recover from oil contamination, the response methods and wave energy environment can influence the degree of recovery and the length of time required. However, a low-probability catastrophic oil spill is not much more likely with the proposed CPA lease sale than without it, given the existing level of OCS oil- and gas-related activities and the small incremental increase in that activity expected from the proposed CPA lease sale. Therefore, none of these sources reveal reasonably foreseeable significantly greater adverse impacts whether or not the No Action or an Action alternative is chosen under this Supplemental EIS.

There are also data gaps regarding the future restoration efforts being planned in coastal states, such as what projects will ultimately be constructed and how successful they may be. This information will not be available until such projects are constructed, which is not within the timeline contemplated in the NEPA analysis of this Supplemental EIS. However, BOEM used existing information regarding the effects of past projects, the plans for restoration projects currently being considered under the RESTORE Act, and past effects of coastal development on coastal wetlands to anticipate the benefit of restoration projects in the CPA (Pate, 2014; Gulf Coast Ecosystem Restoration Council, 2014; Texas Commission on Environmental Quality, 2014b; State of Louisiana, Coastal Protection and Restoration Authority, 2014; State of Mississippi, Dept. of Environmental Quality, 2014; Alabama Gulf Coast Recovery Council, 2014; State of Florida, Dept. of Environmental Protection, 2014). BOEM has determined that the scope of the planned restoration projects would likely only partially restore what was present historically along the Gulf Coast, although any restoration of wetlands would reduce the land loss rates. However, BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives because BOEM can extrapolate the effects of the CPA proposed action based on the effects of past lease sales on earlier baselines and can reasonably use the extrapolation in current analyses.

The rate of future sea-level rise is unknown (Hausfather, 2013), but BOEM has used studies of the effects of sea-level rise on wetland plants, as well as a study that used a likely range of projections of sea-level rise (Glick et al., 2013), to assess the likely impacts of sea-level rise to the baseline environment. BOEM used this existing information to determine possible impacts of a natural non-OCS oil- and gas-related activity on an altered coast and compare it with the possible impacts of the CPA proposed action. BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives because BOEM can extrapolate the effects of the CPA proposed action on expected reduced future acreages of wetlands based on the effects of past lease sales on earlier baselines.

Summary and Conclusion

BOEM has reexamined the analysis for wetlands presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new information was discovered that would alter the impact conclusion for wetlands presented in those NEPA documents. The analysis and potential impacts detailed and updated in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.5. Seagrass Communities

BOEM has reexamined the analysis for seagrass communities presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new information was

discovered that would alter the impact conclusion for seagrass communities presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.5 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.5 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.5 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors on seagrass communities of the CPA are the construction of pipelines, canals, navigation channels, and onshore facilities; maintenance dredging; and vessel traffic (e.g., propeller scars). These factors could result in plants being uprooted, submerged vegetation beds being scarred or lost; decreased oxygen in the water; turbidity; and the burial of plants from suspended sediment. However, the routine OCS oil- and gas-related activities in the CPA impacting seagrasses are not predicted to significantly increase in occurrence and range in the near future. Only a single new pipeline landfall has the potential to be installed as a result of the CPA proposed action. Requirements of other Federal and State programs, such as avoidance of seagrass and submerged vegetation communities or the use of turbidity curtains, reduce undesirable effects on submerged vegetation beds from potentially harmful activities. Local programs decrease the occurrence of prop scarring in grass beds, and generally channels used by OCS oil- and gas-related vessels are away from exposed submerged vegetation beds. Because of these requirements and implemented programs, along with the beneficial effects of natural flushing (e.g., from winds and currents), any potential effects from routine OCS oil- and gas-related activities on submerged vegetation in the CPA are expected to be short term, localized, and not significantly adverse.

Accidental disturbances resulting from the CPA proposed action, including oil spills, have the potential to change community structure, decrease growth rates, cause death, or cause a decline in ecological services by seagrass communities of the CPA if an accidental event was to occur in close proximity to these habitats. Although the size would be small and the duration would be short term, the greatest threat to inland, submerged vegetation communities would be from an inland spill resulting from a vessel accident or pipeline rupture. Because pipelines can be shut off, ships carry limited amounts of oil, and response vessels can more easily access nearshore areas, it is expected that the resulting spill would be small and shorter in duration, resulting in short-term and localized impacts. There is also the remote possibility of a small offshore spill reaching submerged vegetation beds; this would have similar effects as an inshore spill. The resulting impacts to seagrass from contacting oil could range from the sloughing of epiphytes to plant death. Further, an offshore spill could result in more sinking oil (e.g., tarballs and patties) than an inshore spill, and oil could become entrained within seagrass root and leaf complex near the seafloor. Because prevention and cleanup measures can have negative effects on submerged vegetation, close monitoring and restrictions on the use of bottom-disturbing equipment would be needed to avoid or minimize those impacts. The floating nature of nondispersed crude oil, the regional microtidal range, the dynamic climate with mild temperatures, and the amount of microorganisms that consume oil would alleviate prolonged effects on submerged vegetation communities. Also, safety and spill-prevention technologies are expected to continue to improve and will minimize the effects to submerged vegetation from an accidental event related to the CPA proposed action. Impacts to submerged vegetation from an accidental event related to the CPA proposed action are expected to be negligible.

Cumulative Impacts

The cumulative OCS oil- and gas-related activities that present the greatest threat of impacts to submerged vegetation communities are dredging, oil spills, and pipeline installation. In general, the CPA proposed action would cause a minor incremental contribution to impacts on submerged vegetation from

related dredging, pipeline installations, and oil spills. Of those mentioned above, dredging generates the greatest overall risk to submerged vegetation by uprooting and burying plants, decreasing oxygen in the water, and reducing water clarity in an area. A low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, could also impact seagrass communities. Refer to **Appendix B** for more details on the impacts of a low-probability catastrophic spill. Further, non-OCS oil- and gas-related dredging and vessel traffic, boat scarring, changes in salinity and nutrient inputs (Waycott et al., 2009; Orth et al., 2006), changes to natural flow regimes from constructed structures, and storm events could continue to cause direct damage to seagrass beds by physical destruction, increased turbidity and burial of plants, and reduction in favorable environmental conditions for seagrass bed growth. However, the incremental contribution of stress from the CPA proposed action to submerged vegetation is reduced by the implementation of proposed lease stipulations, mitigating measures currently in place, and the small probability of an oil spill. The incremental contribution of the CPA proposed action to the overall cumulative impacts on seagrass communities that would result from the OCS Program and non-OCS oil- and gas-related activities is expected to be negligible.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search of various printed and Internet sources was conducted for any recent information published regarding coastal submerged vegetation. Sources investigated include BOEM, the National Oceanic and Atmospheric Administration, the USGS National Wetlands Research Center, the USGS Gulf of Mexico Integrated Science Data Information Management System, Seagrass Watch, Gulf of Mexico Alliance, State environmental agencies, USEPA, and coastal universities. Other websites from scientific publication databases (including Science Direct, SCIRUS, Google Scholar, Elsevier, Pro Quest, and JSTOR) were checked for new information using general Internet searches based on major themes. The NRDA Trustees' recently published Final PDARP/PEIS provides findings about seagrass communities along the Chandeleur Islands (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). Seagrass bed mapping identified both "persistent loss" (defined as loss for two consecutive mapping intervals) and "delayed loss" (area where seagrass was present in the years during or immediately following the *Deepwater Horizon* oil spill, but was then lost in 2012); however, this loss was a small percentage of the estimated seagrass coverage. This information does not change the conclusions presented in the prior 2012-2017 Gulf of Mexico EISs because this information does not change the baseline information.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the previous conclusions from the prior 2012-2017 Gulf of Mexico EISs are still valid because no new information on seagrass communities pertinent to the CPA proposed action has become available since publication of those NEPA documents. BOEM has identified unavailable information regarding seagrass communities in the CPA. This information cannot reasonably be obtained because the long-term effects may not yet be detectable and the overall costs in time and money to determine this are exorbitant. This unavailable information may be relevant to adverse effects because much of the data related to research and monitoring of the *Deepwater Horizon* explosion, oil spill, and response has yet to be completed and made publicly available. Other unavailable information may be related to university-related research that has yet to be published as a thesis or a dissertation.

BOEM used existing information and reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. For example, Fodrie and Heck (2011) did not sample all of the seagrasses across the northern GOM, but they sampled enough locations where OCS oil- and gas-related resource development occurs to allow for a general conclusion that changes within seagrass beds are not related to OCS oil- and gas-related development or the *Deepwater Horizon* oil spill. Gab-Alla (2000), Nievales (2009), and Mauseth et al. (2001) each showed that, historically, oil spills in other parts of the world have had little long-term negative impact on seagrass environments. Overall, none of the new sources or sources referenced in the

prior 2012-2017 Gulf of Mexico EISs reveal any reasonably foreseeable significant adverse impacts as a result of the CPA proposed action.

Summary and Conclusion

BOEM has reexamined the analysis for seagrass communities presented in the prior 2012-2017 Gulf of Mexico EISs and, even after evaluating the information above, BOEM has determined that no new significant information on seagrass communities has been published since those NEPA documents were published. Therefore, the analysis, potential impacts discussed, and impact conclusions for seagrass communities in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.6. Live Bottoms (Pinnacle Trend and Low Relief)

BOEM has reexamined the analysis for live bottoms presented in the prior 2012-2017 Gulf of Mexico EISs based on additional information presented below. No new significant information was discovered that would alter the impact conclusion for live bottoms presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.6 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.6 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.6 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors on live bottoms of the CPA are seafloor-disturbing activities (e.g., anchoring, infrastructure emplacement, and infrastructure removal), waste discharge (e.g., produced waters and drilling muds), resuspension of sediments (e.g., drill cuttings and pipeline burial), and explosive severance activities. These impact-producing factors have the potential to damage live bottom habitats and disrupt associated communities. Potential impacts as a result of seafloor-disturbing activities are mitigated through avoidance. The proposed Live Bottom (Pinnacle Trend) Stipulation would protect features by requiring all bottom-disturbing activity be distanced at least 30 m (100 ft) from pinnacles. In addition, case-by-case reviews of permit applications allow BOEM to identify and protect live bottoms that occur outside identified live bottom low-relief blocks. A Live Bottom (Low Relief) Stipulation can also be applied to leases in live bottom low-relief blocks with water depths of 100 m (328 ft) or less in the EPA and northeast corner of the CPA; however, no blocks subject to the Live Bottom (Low Relief) Stipulation will be offered for lease in the proposed CPA lease sale. Measures distancing wells and structures from live bottom features would also reduce the potential for other impact-producing factors to adversely affect live bottom organisms. Impacts would be expected to be negligible.

Waste discharges from routine OCS oil- and gas-related operations may cause localized increases in turbidity or be moderately toxic to marine organisms at the point of discharge, potentially impacting benthos near drill sites. However, waste discharges rapidly disperse and would have little or no measurable effect on organisms inhabiting live bottoms distanced 30 m (100 ft) or more from the discharge point. Drilling muds and cuttings may be diluted 100 times at a distance of 10 m (33 ft) from the source, and up to 1,000 times more diluted at a distance of 100 m (328 ft) from the discharge point (Neff, 2005). Deposition of drilling muds and cuttings near the Pinnacle Trend and low-relief areas, distanced 30 m (100 ft) or more from OCS oil- and gas-related activities, would not greatly impact the biota of the live bottoms because the communities associated with live bottom features in the CPA are adapted to turbid (nepheloid) conditions and high sedimentation rates associated with the outflow of the Mississippi River (Gittings et al., 1992). Similarly, structure removal, pipeline burial, and other activities that resuspend sediment have the potential to impact communities associated with live bottoms if not sufficiently distanced from these features. The proposed Live Bottom (Pinnacle Trend) Stipulation and BOEM's case-by-case reviews would prevent these activities from occurring within 30 m (100 ft) of any live bottom, mitigating potential impacts.

The use of explosive severance methods during decommissioning activities has the potential to impact live bottoms and associated fauna. The BSEE Interim Policy Document 2013-07, "Rigs-to-Reefs Policy," specifies the use of explosive severance methods "will not be approved if analysis determines they will cause harm to established artificial reef sites and/or natural biological/topographic features, such as the Flower Garden Banks and Pinnacles." This policy, coupled with the distancing requirement and case-by-case reviews to identify and protect sensitive habitat, will minimize any potential for live bottoms to be adversely impacted by decommissioning operations.

Accidental disturbances resulting from the CPA proposed action, including oil spills, have the potential to damage live bottom habitats and disrupt associated communities. Live bottom features represent a small fraction of the continental shelf area in the CPA. The proposed Live Bottom (Pinnacle Trend) Stipulation (**Chapter 2.3.1.3.2**) and case-by-case reviews of permit applications would distance activities that could result in oil spills and loss of well control at least 30 m (100 ft) from the features, mitigating most of the potential impacts. In a subsurface spill or loss of well control situation, it would be expected that the majority of released oil would rise to the surface and that the most heavily oiled sediments would likely be deposited before reaching live bottom features. A subsurface plume may impact sessile biota of live bottom features. Impacts may include loss of habitat, biodiversity, and live coverage; change in community structure; and reduced reproductive success. Distancing OCS oil- and gas-related activities from these features would allow for oil to mix with the surrounding water and become less concentrated, thus reducing toxicity to live bottom organisms.

Surface oil spills also have the potential to impact live bottom features. Some pinnacle features rise to within 40 m (130 ft) of the sea surface, while many others have much less relief or are in deeper waters. The distance to the sea surface serves to buffer these features from surface spills. Any oil that might contact pinnacle features would probably be at low concentrations because the expected mixing depth in the water column is usually less than the peak of the tallest pinnacles. Outside the designated Live Bottom (Low Relief) blocks, low-relief features are typically found at depths sufficiently deep to prevent surface spills from severely impacting sensitive habitat. Oil becomes diluted as it physically mixes with the surrounding water and moves into the water column. Any oil that might be driven to a depth of 10 m (33 ft) or more is expected to be diluted to such a degree that any effects to these features would be minor. Any features in water shallower than 10 m (33 ft) would be located far from the source of activities in the CPA proposed action. Therefore, concentrated oil is not normally expected to reach live bottom features, and any impacts from diluted oil would be sublethal.

Suspended sediment and oil adhered to sediment in the water column as a result of a loss of well control may impact benthic organisms. However, because OCS oil- and gas-related activities would be distanced at least 30 m (100 ft) from live bottom features, the heaviest sediment concentrations would be expected to fall out of suspension and disperse before sensitive features could be severely impacted. Live bottom organisms of the CPA are located within the influence of the Mississippi River plume and are generally adapted to turbid (nepheloid) conditions and high sedimentation rates associated with the outflow of the Mississippi River (Gittings et al., 1992). Many organisms also have the ability to rid themselves of sediment through ciliary action and mucus shedding.

In summary, the proposed Live Bottom (Pinnacle Trend) Stipulation and case-by-case reviews of permit applications would, through avoidance, mitigate potential impacts to live bottom communities as a result of routine activities and accidental disturbances. In addition, because no Live Bottom (Low Relief) blocks are included in the CPA proposed action, most live bottom features are distanced from oil-producing activity. In the unlikely event that oil from a spill reached the biota of a live bottom, the effects would be primarily sublethal and impacts would be at the community level. However, in such an event, if oil impacted a live bottom community at lethal concentrations, coral recovery could take in excess of 10 years (Fucik et al., 1984). Overall impacts as a result of routine activities and accidental disturbances would be expected to be minor.

Cumulative Impacts

The cumulative analysis considers impacts resulting from ongoing routine oil and gas operations, as well as those resulting from past and future OCS leasing. These impacts include seafloor-disturbances (e.g., anchoring, structure emplacement, and structure removal), waste discharge (e.g., drilling muds, cuttings, and effluent), and accidental disturbances (e.g., loss of well control and oil spills). Potential

non-OCS oil- and gas-related factors include vessel anchoring, import tankering, storms, and commercial fishing.

The OCS oil- and gas-related seafloor-disturbing activities represent the greatest threat to live bottoms. Potential impacts may be avoided through the continued application of the proposed Live Bottom (Pinnacle Trend) Stipulation and case-by-case review of permit applications for the presence of live bottom habitat and mitigation of potential impacts. This stipulation would avoid mechanical damage to live bottom habitat by prohibiting bottom-disturbing activities from occurring within 30 m (100 ft) of live bottoms. The 30-m (100-ft) buffer would also diminish the potential for adverse impacts resulting from operational discharges, due to the highly localized and temporary effect of such discharges. The USEPA's discharge regulations and permits further reduce the potential for discharge-related impacts.

The majority of oil released below the sea surface rises and should not physically contact organisms on live bottoms. In the unlikely event that oil from a subsurface spill would reach the biota of a live bottom, the effects would be primarily sublethal. In the very unlikely event that oil from a subsurface spill reached an area containing coral cover in lethal concentrations, the recovery period could exceed 10 years (Fucik et al., 1984). In the event that a live bottom suffers severe mechanical damage (e.g., vessel collision), recovery could take decades depending on the extent of the damage. Because these events are rare, the potential for impacts is considered low. For information on impacts resulting from a catastrophic spill, refer to **Appendix B**.

Non-OCS oil- and gas-related activities (e.g., anchoring, trawling, and vessel collisions) can damage live bottom habitats, resulting in impacts similar to those described above. Commercial fishing activities may dislodge or damage organisms inhabiting live bottom habitats if lines or trawls are dragged across the live bottom surface or become entangled. Natural events of sufficient magnitude (e.g., hurricanes or earthquakes) may also cause severe impacts. Recreational SCUBA diving, fishing, and discharges or spills from tankering of imported oil may also have adverse impacts on live bottoms. Overall, the incremental contribution of the CPA proposed action to the cumulative impact is negligible.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search of Internet information sources and scientific journals was conducted to determine the availability of recent information. This search revealed new information relevant to an analysis of the potential impacts of OCS oil- and gas-related activities on live bottom benthic communities.

The most relevant information for this Supplemental EIS was the publication of data related to the apparent mixing of surface waters to a depth of at least 75 m (246 ft) in the Pinnacle Trend area during the passage of Tropical Storm Bonnie in July 2010 (Silva et al., 2015). These mixing depths are greater than what has been previously expected under normal conditions, and the authors hypothesize unusually strong wave action from the storm as the mechanism. The significance for live bottom features is that Silva et al. (2015) also documented acute impacts to gorgonians and black corals on two large Pinnacle Trend reef features at these depths, seemingly caused by acute exposure to high concentrations of surface oil and/or an oil-dispersant mixture (presumably sourced from the *Deepwater Horizon* explosion and oil spill). The submerged oil and/or dispersant likely reached the live bottom features in relatively undiluted concentrations, leading to lethal and sublethal impacts. This situation did come to pass during Tropical Storm Bonnie, but doing so likely required a highly unusual combination of necessary conditions: (1) a very large amount of surface oil associated with a catastrophic-level spill event (much greater than the amount expected for accidental events); and (2) unusually strong winds and surface waves that are only expected during tropical storm-level extreme weather conditions such as Tropical Storm Bonnie. Therefore, though this result is noteworthy, its unlikelihood and the catastrophic levels of oil/dispersant involved means that it does not change the overall conclusions for accidental impacts to live bottom features.

Other similar new information was found in the NRDA Trustees' recently published Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Trustees identified direct injuries to both hard and soft corals and other benthic organisms associated with these communities, including those described in Silva et al. (2015). The Trustees also predicted that these harmful effects on coral individuals, colonies, and communities had the potential to degrade overall

ecosystem health and function. While the Trustees' Final PDARP/PEIS provides additional interpretative analyses, it does not alter the conclusions of the prior 2012-2017 Gulf of Mexico EISs.

For additional information, refer to **Chapters 4.1.1.18 and 4.1.1.19** of this Supplemental EIS and Chapters 4.1.1.18 and 4.1.1.19 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. Therefore, BOEM finds that, as more information has become available, the research supports the analyses in anticipating localized, temporary impacts.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. Even with the recent release of the Final PDARP/PEIS, as discussed in this Supplemental EIS, as well as in the prior 2012-2017 Gulf of Mexico EISs, BOEM has identified incomplete or unavailable information related to live bottoms in the CPA. The information presented in Silva et al. (2015) demonstrates the incomplete state of knowledge about various potential impacts to organisms associated with live bottoms (Pinnacle Trend and low relief) as a result of the *Deepwater Horizon* oil spill and response. However, available information on species and habitats similar to those associated with the Pinnacle Trend and low relief live bottoms provides sufficient basis from which to extrapolate potential impacts from routine activities and accidental events; it is reasonable to assume that similar responses may be expected. Additional data collected in the vicinity of the Pinnacle Trend features are under development through the NRDA process and may be relevant to an analysis of live bottom (Pinnacle Trend and low relief) habitat in the CPA. However, further analysis of these data may take years to complete and the outcome cannot be predicted. Although the body of available information is incomplete and long-term effects are not yet known, evidence does not suggest that assemblages associated with live bottom (Pinnacle Trend and low relief) habitat are likely to sustain severe adverse impacts from routine activities and accidental events (refer to **Appendix B** for more information about catastrophic spill impacts). BOEM has determined that the incomplete or unavailable information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for live bottoms presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for live bottoms presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.7. Topographic Features

BOEM has reexamined the analysis for topographic features presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for topographic features presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.7 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.7 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.7 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Topographic features are hard bottom habitats and are rare compared with the ubiquitous soft bottoms in the GOM (Parker et al., 1983). These features can be upthrusts of rock due to an uplift of the underlying salt (diapirs) or the remnants of fossilized shorelines. These topographic highs, or subsea

banks, provide an island of hard substrate in a virtual ocean of soft bottoms. Wherever rock protrudes up into the water column, reef organisms may thrive. The type of organisms inhabiting a reef is determined by environmental conditions. There are 37 protected topographic features in the GOM: 21 in the WPA and 16 in the CPA.

Because of the recognized importance of the topographic features, BOEM proposes attaching the Topographic Features Stipulation to OCS oil and gas leases within Topographic Feature Stipulation blocks. When applied, this mitigation would prevent most of the potential impacts on topographic features from bottom-disturbing activities (structure removal and emplacement) and operational discharges associated with the CPA proposed action through avoidance. In addition, it would distance topographic features from possible accidental events. The mitigation would require that bottom-disturbing activities be located at least 152 m (500 ft) from a topographic feature's No Activity Zone and that drill cuttings and fluids from wells within designated shunting zones must be shunted to the seafloor, although shunting requirements can vary among features.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors on topographic features of the CPA could include bottom-disturbing activities such as anchoring, infrastructure emplacement or removal, and drilling-effluent and produced-water discharges. These factors could result in crushing and smothering of sensitive organisms and exposure to concentrated discharges. If the Topographic Features Stipulation is applied, it will minimize the potential impacts to the topographic features by distancing bottom-disturbing activities from the sensitive habitat. The distancing eliminates the possibility of anchors, pipelines, and structures being placed on top of the features, and structure removal activity will be distanced enough to minimize impacts to topographic features. If any contaminants reach topographic features, the contaminants would be diluted from their original concentration, and impacts that may occur should be minimal. In addition to the mitigations, discharges or activities that could harm topographic features are regulated by other agencies, including discharge permit restrictions from USEPA and essential fish habitat restrictions from NOAA. Furthermore, the high-energy environment and prevailing water currents associated with topographic features would help protect the features by enabling rapid turnover of the water column.

Adverse effects from accidental disturbances resulting from the CPA proposed action could include surface and subsurface oil spills, and turbidity and sedimentation from loss of well control with substantial quantities of oil. Each has the potential to disrupt and alter the environmental, commercial, recreational, and aesthetic values of topographic features of the CPA through oiling and sedimentation. The proposed Topographic Features Stipulation would assist in preventing most of the possible accidental impacts on topographic feature communities by increasing the distance of such events from the topographic features. It is expected that the majority of subsurface oil released during an accidental event would rise rapidly to the surface and that the most heavily oiled sediments in the water column would likely be deposited on the seafloor before reaching the topographic features. In the event that diluted oil from a subsurface spill did reach the biota of a topographic feature, the effects would be primarily sublethal and impacts would be at the community level. Any turbidity, sedimentation, and oil adsorbed to sediment particles would also be at low concentrations by the time the topographic features were reached, likely resulting in primarily sublethal impacts. Impacts from a surface oil spill on topographic features are also lessened by the distance of the spill to the features, the depth of the features, and the prevailing water currents that sweep around the features. It should be noted that a low-probability catastrophic spill is not a part of the CPA proposed action and not likely expected to occur. For information on impacts resulting from events outside the scope of routine activities and accidental events, refer to **Appendix B**.

Cumulative Impacts

The cumulative impact from routine OCS oil- and gas-related operations includes effects resulting from the CPA proposed action, as well as those resulting from past and future OCS leasing. These operations include anchoring, structure emplacement, muds and cuttings discharge, effluent discharge, oil spills, and structure removal. Without mitigation, these factors could result in crushing and smothering of organisms on topographic features or exposure to concentrated discharges or oil. Low-probability catastrophic spills in the vicinity of one of these features could also potentially cause damage to benthic

biota (refer to **Appendix B** for more details). It should be noted that a low-probability catastrophic spill is not a part of the CPA proposed action and not likely expected to occur. Impacts from OCS oil- and gas-related activities would be mitigated by the continued application of the proposed Topographic Features Stipulation, precluding physical damage caused by oil and gas leaseholders by establishing a buffer around the features. As such, little impact would be incurred by the biota of the topographic features as a result of OCS oil- and gas-related activities. The USEPA's discharge regulations and permits would further reduce discharge-related impacts.

Potential non-OCS oil- and gas-related factors include vessel anchoring, SCUBA diving, treasure-hunting activities, import tankering, heavy storms and hurricanes, the collapse of the tops of the topographic features due to dissolution of the underlying salt structure, and fishing activities. Many of these non-OCS oil- and gas-related factors may result in physical damage to organisms that colonize topographic features. For example, treasure hunting activities in the 1980's resulted in several large cavities being dug on one of the topographic features that has yet to recover. Anchoring can result in the destruction of hard corals due to the ability of anchor lines to cut through the coral heads. Anchoring can also result in the tearing of soft corals from the seafloor during anchor removal or the movement of the anchoring line through the water column. Because corals and other benthic fauna are slow growing, physical disturbance represents the greatest threat to the organisms that colonize topographic features. With the application of stipulations and regulations, the incremental contribution of the CPA proposed action to the cumulative impact is negligible when compared with non-OCS oil- and gas-related impacts.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 Supplemental EIS

A search of Internet information sources (e.g., NOAA's Gulf Spill Restoration Publications website, NOAA's Environmental Response Management Application [ERMA] Gulf Response website, NOAA's *Deepwater Horizon* Archive Publications and Factsheets, the Gulf of Mexico Sea Grant *Deepwater Horizon* Oil Spill Research and Monitoring Activities Database, RestoreTheGulf.gov website, and the *Deepwater Horizon* Oil Spill Portal) and public search engines to search published journal articles, Federal documents, and research reports was conducted to determine the availability of recent information on topographic features. The search revealed new information on the affected environment that is pertinent to this Supplemental EIS.

For the Flower Gardens, BOEM has published a study in conjunction with the Flower Garden Banks National Marine Sanctuary that monitored multiple species of vertebrates and invertebrates found on the topographic structures (Johnston et al., 2015). They found that the reefs are among the healthiest in the GOM with relatively high coral cover but relatively low species diversity. They also state that the reefs have maintained this status throughout a time period when OCS oil and gas development has occurred in nearby blocks, suggesting that the Topographic Features Stipulation does successfully mitigate against impacts due to routine activities and accidental events.

The most relevant information for this Supplemental EIS was the publication of data related to the apparent mixing of surface waters to a depth similar to that of the topographic features during the passage of Tropical Storm Bonnie in July 2010 (Silva et al., 2015). This mixing resulted in damages to the benthic community of mesophotic reefs due to surface oil on the water surface at the time. Many of these reefs have similar communities and are found at similar depths as most topographic features. As such, if a large storm event did occur in the Gulf and it passed over a topographic feature while there was a substantial amount of surface oil present, impacts to the benthic community would be expected.

The NRDA Trustees' recently published Final PDARP/PEIS provides a series of findings about benthic resources impacts (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Final PDARP/PEIS shows that some mesophotic reefs were impacted, but the included maps confirmed that the only topographic features that had oil pass overhead at the water surface was Sackett Bank. This topographic feature is located approximately 12 mi (19 km) from the southwest pass of the Mississippi River. No specific injuries to Sackett Bank were noted (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. Working in deep marine systems is complex and requires substantial resources, and as such, research on these features has been limited. Thus, there is a substantial amount of information that remains unknown about these features. All analyses discussed in this Supplemental EIS and in the prior 2012-2017 Gulf of Mexico EISs are based on incomplete information. Because topographic features are not unique to the CPA, information collected throughout the GOM has been used in this analysis. For example, our understanding of the possible impacts of surface oil spills to topographic features in the GOM was determined by combining research on the depth and concentration of physical mixing of surface oil with the known depths of CPA topographic features. These results suggest that, although oil measurements were not collected at every feature under every condition, topographic features exist at depths deeper than lethal concentrations of oil would be expected (Lange, 1985; McAuliffe et al., 1975 and 1981; Tkalich and Chan, 2002; Rezak et al., 1983; Wyers et al., 1986) unless dispersants are used. Additionally, continuous monitoring of the Flower Garden Banks since the 1970's for impacts related to OCS development suggests that BOEM's topographic features stipulations may achieve the stated objective of minimizing damage to topographic features from OCS oil- and gas-related activities (refer to Johnston et al., 2013, and references therein). At the Flower Garden Banks, corals have flourished while OCS development has occurred, and in some cases, activities have taken place just outside the mitigation zone. Since corals are generally considered to be more fragile than most other organisms found in the CPA, it is reasonable to conclude that topographic features in the CPA with more resilient organisms than the Flower Garden Banks have not negatively impacted other topographic structures in the GOM.

With respect to unavailable information in relation to the *Deepwater Horizon* explosion, oil spill, and response, the majority of this information cannot be obtained because it has not been released. Relevant data on the status of topographic features may take years to acquire and analyze. This unavailable information may be relevant to adverse effects because the *Deepwater Horizon* explosion, oil spill, and response may have caused changes to baseline conditions for topographic features in the Gulf of Mexico. While outstanding reports are not expected to reveal reasonable foreseeably significant effects, BOEM nonetheless determined that additional information could not be timely acquired and incorporated within the timeline contemplated in the NEPA analysis of this Supplemental EIS. For example, if sampling techniques show that oil concentration were greater at Sackett Bank in the CPA (Sammarco, 2013), then it is possible that more oil reached other topographic features in the CPA than previously reported. Additionally, the conclusions by Felder et al. (2014) and Fredericq et al. (2014) do suggest that changes in the benthic communities coincided with the *Deepwater Horizon* oil spill; however, more information is required to conclude that this is the result of the oil spill, the result of larger ecological processes, or a combination of both. Until this information is collected, analyzed, and made available, it is impossible to make these determinations.

BOEM used existing information and reasonably accepted scientific methodologies to extrapolate from available information in completing this analysis and formulating the conclusions presented here. Although the body of available information is incomplete, the evidence currently available supports past analyses and does not indicate severe adverse impacts to topographic features. Therefore, BOEM has determined that the incomplete or unavailable information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for topographic features presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for topographic features presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis of potential impacts discussed in those documents still applies for the proposed CPA Lease Sale 247. It is concluded that the CPA proposed action would have a negligible or minor impact on the topographic features of the CPA.

4.1.1.8. Sargassum *Communities*

BOEM has reexamined the analysis for *Sargassum* communities presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for *Sargassum* and *Sargassum* communities presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.8 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.8 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.8 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Sargassum is one of the most ecologically important brown algal genera found in the pelagic environment of tropical and subtropical regions of the world. The pelagic complex in the GOM is mainly comprised of *S. natans* and *S. fluitans* (Lee and Moser, 1998; Stoner, 1983; Littler and Littler, 2000). Both species of *Sargassum* live immediately below the water surface and are fully adapted to a pelagic existence (Lee and Moser, 1998). These floating plants may be up to a few meters in length and may be found floating alone or in larger rafts or mats that support communities of fish and a variety of other marine organisms. The distribution, size, and abundance of *Sargassum* mats varies depending on environmental and physiochemical factors such as temperature, salinity, and dissolved oxygen.

Impacts of Routine Activities and Accidental Events

Impact-producing factors associated with routine activities for the CPA proposed action that could affect *Sargassum* communities may include the following: (1) drilling discharges (i.e., muds and cuttings); (2) produced water and well treatment chemicals; (3) operational discharges (i.e., deck drainage, sanitary and domestic water, and bilge and ballast water); and (4) physical disturbance from vessel traffic and the presence of exploration and production structures (i.e., rigs, platforms, and MODUs). Considering *Sargassum*'s widespread distribution and occurrence in the upper water column near the sea surface, it may be contacted by routine discharges from oil and gas operations; however, the quantity and volume of these discharges is relatively small compared with the surface area of pelagic waters of the CPA (268,922 km^2; 103,831 mi^2). Therefore, contact through routine activities would only occur for a small portion of the *Sargassum* population and associated communities. Because these discharges are highly regulated to control toxicity and because they would continue to be diluted in the Gulf water, reducing concentrations of any toxic component, produced-water impacts on *Sargassum* communities would be minimal.

The impingement by service vessels, working platforms, and drillships would contact only a very small portion of the *Sargassum* population. For algae coming in contact with OCS oil- and gas-related equipment, most should remain unharmed as they are pushed out of the way, but a small percentage of algae may be physically destroyed via propellers or stranded and subsequently become desiccated. For animals, the smaller organisms could be stranded with the algae or be destroyed by the equipment. Larger animals that often associate with *Sargassum* could avoid contact with most equipment. Because the distribution of *Sargassum* is dependent on many factors, the result is that the distribution is unpredictable and haphazard. As such, impacts to *Sargassum* communities associated with the CPA proposed action are expected to have a negligible or minor effect on the small portion of the *Sargassum* community that could be contacted. Additionally, *Sargassum* and many of the associated species have adapted a rapid growing lifestyle to allow for rapid recovery from negative impacts. No measurable impacts are expected to the overall population of the *Sargassum* community.

Potential impact-producing factors associated with accidental events for the CPA proposed action that could affect *Sargassum* and its associated communities include (1) spills (i.e., surface oil and fuel spills), (2) spill-response activities, and (3) chemical spills. These impacting factors would have varied effects depending on the intensity of the spill and the presence of *Sargassum* in the area of the spill. All types of spills, including surface oil and fuel spills and chemical spills, could potentially contact *Sargassum*

communities. The quantity and volume of most of these spills would be relatively small compared with the surface waters of the CPA (268,922 km^2; 103,831 mi^2). Therefore, most spills would only contact a small portion of the *Sargassum* complex. Accidental spills would be diluted by Gulf water and, therefore, concentrations of toxic components that could potentially contaminate or kill *Sargassum* tissues or the associated community would also be reduced in this scenario. Any *Sargassum* that did come in contact with large concentrations of oil would eventually sink and advect oil bound to the algae to the seafloor. Presumably, any vessel contact during response activities to *Sargassum* would be to capture algae that are dead or dying due to contact with oil released during a spill; as such, response vessels would not impact the algae more than they are already impacted by the oil. The impacts to *Sargassum* associated with the CPA proposed action are expected to have only minor effects to a small portion of the *Sargassum* community. In the case of a very large spill, the consequences would be death of a large number of algae across a geographically large area in the northern Gulf of Mexico. However, the *Sargassum* community complex lives in pelagic waters with generally high water quality and is expected to show good resilience to the predicted effects of spills. It has a yearly growth cycle that promotes quick recovery from impacts and that would be expected to restore typical population levels in 1-2 growing seasons. For information on the impacts resulting from events outside the scope of routine activities and accidental events, refer to **Appendix B**.

Cumulative Impacts

Cumulative impacts from OCS oil- and gas-related operations include effects resulting from the CPA proposed action, as well as those resulting from past and future OCS leasing. These operations include drilling discharges, produced water and well treatment chemicals, operational discharges, accidental spills, and physical disturbance from OCS oil- and gas-related vessels and structures. Potential non-OCS oil- and gas-related factors include hurricanes, water quality, and non-OCS oil- and gas-related vessel traffic.

The OCS oil- and gas-related vessels transiting the GOM pass through *Sargassum* mats, producing slight impacts to the *Sargassum* community by breaking up clumps/mats or physically destroying the algae. Turbulence from wakes and direct damage from propellers on vessels servicing OCS oil- and gas-related activities could affect *Sargassum* by breaking up mats or destroying strands. However, the amount of damage that vessels could inflict on a *Sargassum* mat would be minimized because of *Sargassum*'s temporary and seasonal nature. When present, *Sargassum* mats are naturally loose knit with the ability to break apart and re-form. Any vessel-related damage would likely be seen in the community of organisms inhabiting these mats, which may be killed when being struck by a vessel. Sea turtles and small fishes that reside in (rather than below) *Sargassum* mats would be most susceptible to this type of damage. However, the footprint of any vessel in the CPA is small compared with the distribution of *Sargassum*, and its transitory life history minimizes the possibility that any mat or the inhabitants are routinely affected. None of these would have more than minor localized effects to the affected mats as these mats routinely break up and move across extensive areas. The OCS oil- and gas-related structures can alter the movement of *Sargassum* mats and entrap small quantities of the algae. Because the CPA proposed action is not expected to substantially increase (if any) the number of OCS oil- and gas-related vessels, it is likely that OCS oil- and gas-related activities will only have a minimum and local effect on the *Sargassum* community.

Accidental spills could contribute to the cumulative impacts of OCS oil- and gas-related activities if an accidental spill was exceptionally large, located in the "nursery" area where *Sargassum* resides in the western GOM, and was during a time of the year when the standing stock is restricted to the "nursery" area (e.g., late winter and spring) (Gower and King, 2011). The probability of this happening temporally and spatially is extremely low (refer to **Appendix B**). Given the life history of *Sargassum,* recovery of the algae could occur relatively rapidly; however, during the recovery period, animals that rely on *Sargassum* to move around the Gulf or use *Sargassum* for refuge would be severely impacted due to the loss of habitat or a method of transportation. Cumulative impacts would be most pronounced for animals that rely exclusively on *Sargassum* and have low reproduction rates or have larvae that only disperse locally. Any noncatastrophic spill would likely only result in localized and short-term adverse impacts that would contribute little to the overall cumulative effect of the CPA proposed action.

Potential non-OCS oil- and gas-related factors include hurricanes, water quality, and non-OCS oil- and gas-related vessel traffic. Hurricanes are major natural sources of impacts that affect *Sargassum*.

The energy associated with these storms can break up mats, destroy strands, and displace animals; however, the life history and the widespread distribution of *Sargassum* communities minimize the probability that any given storm will have any lasting population-level effects. Violent surface turbulence caused by these storms would dislocate many of the organisms living on and in the *Sargassum*. Some of the organisms (those that cannot swim or swim only weakly) such as nudibranchs (sea slugs), shrimp, *Sargassum* fish (*Histrio histrio*), and pipefish (*Syngnathus* spp.) would become separated from the algae. Without cover, many would fall prey to fish after a storm; others may sink to the seafloor and die. Some epifauna, such as hydroids, living on the algae may suffer physical damage or be broken off. Hurricanes can also drive *Sargassum* into waters less conducive for growth and can strand large quantities on beaches. In addition, *Sargassum* communities may be susceptible to nonpoint-source pollution from land-based runoffs carrying pollutants and excessive nutrients, especially in nearshore areas. The results could be a basinwide reduction in *Sargassum* biomass. Turbulence from wakes, direct damage from propellers, impingement on non-OCS oil- and gas-related vessels (i.e., commercial shipping, fishing activity, and pleasure boating) could also affect *Sargassum* by breaking up mats, destroying algae, or stranding algae. However, the amount of damage that vessels could inflict on a *Sargassum* mat would be minimized because of *Sargassum*'s transitory nature. Any vessel-related damage would likely be seen in the community of organisms inhabiting these mats, which may be killed by being struck by a vessel. Sea turtles and small fishes that reside in (rather than below) *Sargassum* mats would be most susceptible to this type of damage. The incremental contribution of the CPA proposed action to the overall cumulative impacts on *Sargassum* communities that would result from the OCS Program, environmental factors, and non-OCS oil- and gas-related activities is expected to be minimal.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search of Internet information sources (e.g., NOAA's Gulf Spill Restoration Publications website and Environmental Response Management Application [ERMA] Gulf Response website, NOAA's *Deepwater Horizon* Archive Publications and Factsheets, the Gulf of Mexico Sea Grant *Deepwater Horizon* Oil Spill Research and Monitoring Activities Database, RestoreTheGulf.gov website, and the *Deepwater Horizon* Oil Spill Portal) and public search engines to search published journal articles, Federal documents, and research reports was conducted to determine the availability of recent information on *Sargassum* communities. The search revealed new information on nursery areas for *Sargassum*, *Sargassum*'s suitability as habitat for other organisms, and impacts related to oil and dispersant exposure.

The primary publication relevant to this Supplemental EIS is the delineation of the *Sargassum* cycle (Frazier et al., 2015). Using a combination of satellite imaging and ground truthing, Frazier et al. (2015) determined that the life history of *Sargassum* in the GOM is part of a larger cycle that includes the mid-Atlantic Ocean and Caribbean Sea. This cycle begins in the Sargasso Sea where *Sargassum* remains year round. However, winds and currents move some of this *Sargassum* south into the Caribbean Sea and eventually into the Gulf of Mexico via the Yucatan Peninsula. Once in the GOM, it moves into the western area where it feeds off the nutrient input from coastal rivers, including the Mississippi River. As *Sargassum* abundance increases, plants will continue to travel east during the summer months; however, a large quantity of plants will travel into the nearshore where they will be deposited on coastal beaches. Eventually the plants moving east will be incorporated into the Gulf Stream where they return to the Sargasso Sea. Throughout this cycle, plants will continue to grow, die, and reproduce. When a plant dies, it can sink to the seafloor, transporting nutrients and resources to the seafloor (Coston-Clements et al., 1991; Parr, 1939; Wei et al., 2012). Although the cycle continues year round, the rapid growth of *Sargassum* populations in the western Gulf of Mexico typically occur during the spring/summer of the year (Gower et al., 2006, Gower and King, 2008 and 2011). Estimates suggest that between 0.6 and 6 million metric tons of *Sargassum* are present annually in the Gulf of Mexico, with an additional 100 million metric tons exported to the Atlantic basin (Gower and King, 2008 and 2011; Gower et al., 2013). *Sargassum* deposition on GOM beaches is important because *Sargassum* facilitates dune stabilization and provides a pathway for nutrient and energy transfer from the marine environment to the terrestrial environment (Webster and Linton, 2013). The spatial expanse of this life history facilitates the rapid recovery from episodic environmental perturbations because of the remote probability that any single event could impact the entire spatial distribution.

Other new and relevant information was found in the NRDA Trustees' recently published Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Trustees quantified the loss of *Sargassum* resulting from direct oiling and projected loss due to foregone growth. Overall, they estimated that, for 2010, there was a loss of approximately 23 percent of the *Sargassum* in the northern Gulf of Mexico due to direct exposure. However, they also noted that, for the area impacted by oil on the surface, the *Sargassum* is continually replenished during the growing season with a turnover time of approximately 6 weeks (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in this Supplemental EIS and in Chapter 4.2.1.8 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231Supplemental EIS and Chapter 4.1.1.8 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, BOEM has identified unavailable information regarding *Sargassum* and *Sargassum* communities in the CPA. This incomplete or unavailable information includes information on the effects of *in-situ* oil exposure and the movement patterns of *Sargassum*. BOEM used existing information and reasonably accepted scientific methodologies to extrapolate in completing this analysis. BOEM has determined that there are few foreseeable significant adverse impacts to the *Sargassum* population associated with routine activities or accidental OCS oil- and gas-related events using publications such as Frazier et al. (2015), Gower and King (2011), Gower et al. (2013), and Powers et al. (2013). Gower and King (2011) and Gower et al. (2013) suggest that *Sargassum* is continually present in the west-central GOM and that it moves in a general west to east pattern during the growing season; however, movements at a finer temporal or spatial scale are more difficult to predict. Frazier et al. (2015) expanded on the work by Gower and King (2011) to further delineate the life cycle of *Sargassum.* Although the large rafts identified by Gower and King (2011) were prevalent during the warmer months in the GOM, Frazier et al. (2015) found that *Sargassum* was continuously moving through cycle. Liu et al. (2014) noted that the toxicity or the presence of oil across the surface waters of the GOM was also variable at any given time, suggesting that it is difficult to predict the effects of coming in contact with surface oil. Additionally, Lindo-Atichati (2012) suggested that patterns of larval fish in the surface currents in the northern GOM were not consistent spatially or temporally and that they were highly dependent on mesoscale current structures like the Loop Current and associated eddies. Combined, these studies suggest that, as *Sargassum* is passively moved in the surface waters, its presence at any given location or at any given time is difficult to predict, especially as the population grows exponentially during the growing season. Powers et al. (2013) also suggest that there were adverse effects to *Sargassum* under the proper conditions, but the spatial or temporal extent of those effects remain unknown. It is expected that for routine activities or accidental events the probability of enough *Sargassum* coming in contact with oil and dying as a result of this contact are low given that oil and *Sargassum* are each controlled by surface currents in differential manners. Ultimately, the cosmopolitan nature across the northern GOM and the reproductive capabilities of *Sargassum* provide a life history that is resilient towards localized or short-term deleterious effects, such as those expected to be associated with routine OCS oil- and gas-related activities and noncatastrophic oil or chemical spills. Therefore, BOEM has determined that the incomplete information on *Sargassum* is not essential to a reasoned choice among alternatives and that the information used in lieu of the missing information is acceptable for this analysis.

Even with the recent publication of the Final PDARP/PEIS, BOEM recognizes that the incomplete information, with respect to possible impacts to *Sargassum* in the CPA as a result of the *Deepwater Horizon* explosion, oil spill, and response, may be relevant to the evaluation of impacts. Because of this, BOEM's subject-matter experts have used available scientifically credible evidence in this analysis and applied it using accepted scientific methods and approaches to extrapolate in completing this analysis. *Sargassum* communities within the CPA were affected by the *Deepwater Horizon* explosion, oil spill, and response; however, because the spill did not occur near an area where *Sargassum* persists year round, abundance recovered rapidly. Powers et al. (2013) documented a four-fold increase in *Sargassum* in the north-central GOM in the years following the spill. Additional information related to other possible adverse impacts of the *Deepwater Horizon* explosion, oil spill, and response to *Sargassum* communities

in the CPA cannot be obtained during the timeline contemplated in the NEPA analysis of this Supplemental EIS because data related to research and monitoring related to the *Deepwater Horizon* explosion, oil spill, and response has yet to be completed and made publicly available. Therefore, BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for *Sargassum* communities presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for *Sargassum* communities presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.9. Chemosynthetic Deepwater Benthic Communities

BOEM has reexamined the analysis for chemosynthetic deepwater benthic communities presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for chemosynthetic deepwater benthic communities presented in those previous NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.9 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.9 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.9 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors on chemosynthetic deepwater benthic communities of the CPA are bottom-disturbing activities associated with anchoring, structure emplacement, pipelaying, structure removal, and discharges of drill cuttings, muds, and produced water. The application of avoidance criteria for chemosynthetic communities provided as guidance in NTL 2009-G40, "Deepwater Benthic Communities," typically precludes the placement of a well within 2,000 ft (610 m) of any suspected site of a chemosynthetic community. Considerable mechanical damage could be inflicted upon deepwater chemosynthetic communities by routine OCS oil- and gas-related drilling activities associated with the CPA proposed action if mitigations are not applied to permits.

Bottom-disturbing activities associated with anchoring, structure emplacement, pipelaying, and structure removal cause localized bottom disturbances and disruption of benthic communities in the immediate area. Routine discharge of drill cuttings with associated muds can also affect the seafloor. Without mitigating measures, these activities could result in smothering by the suspension of sediments or the crushing of organisms residing in these communities. The risk of these physical impacts is greatly reduced by requiring the avoidance of potential chemosynthetic communities. Discharges of produced waters on the sea surface, chemical spills, and deck runoff would be diluted in surface waters, having no effect on seafloor habitats. Impacts from bottom-disturbing activities directly on chemosynthetic communities are expected to be extremely rare because of the application of required protective measures as provided as guidance by NTL 2009-G40. Information included in required hazards surveys for OCS oil- and gas-related activities depicts areas that could potentially harbor chemosynthetic communities. This allows BOEM to require avoidance of any areas that are conducive to chemosynthetic growth. If a high-density community is subjected to direct impacts by bottom-disturbing activities, potentially severe or catastrophic impacts could occur due to raking of the sea bottom by anchors and anchor chains, and partial or complete burial by muds and cuttings. The severity of such an impact is such that there would be incremental losses of productivity, reproduction, community relationships, and overall ecological

functions of the local community, and incremental damage to ecological relationships with the surrounding benthos.

Routine activities of the CPA proposed action are expected to cause no damage to the ecological function or biological productivity of chemosynthetic communities. Widely scattered, high-density chemosynthetic communities would not be expected to experience impacts from routine OCS oil- and gas-related activities in deep water because the impacts would be limited by the required avoidance criteria. Impacts on chemosynthetic communities from routine activities associated with the CPA proposed action would be minimal to none.

Accidental disturbances from the CPA proposed action, including subsea oil spills, have the potential to result in impacts on chemosynthetic communities of the CPA. Accidental events that could impact chemosynthetic communities are primarily limited to seafloor loss of well control. A loss of well control event at the seafloor could create a crater and could resuspend and disperse large quantities of bottom sediments. Chemosynthetic communities could be susceptible to physical impacts, including smothering, from a loss of well control event depending on bottom-current conditions. The avoidance criteria described above reduces the risk of these physical impacts by requiring a buffer of 2,000 ft (610 m) from wells. The avoidance required would protect sensitive communities from heavy sedimentation, with only light sediment components reaching the communities in small quantities.

Studies indicate that periods as long as hundreds of years are required to reestablish a seep community once it has disappeared (depending on the community type) (Powell, 1995; Fisher, 1995). There is evidence that substantial impacts on these communities could permanently prevent reestablishment (Fisher, 1995), particularly if hard substrate required for recolonization is buried by resuspended sediments from a loss of well control. Because widely scattered, high-density chemosynthetic communities would typically be located at more than 2,000 ft (610 m) away from a loss of well control event due to mitigating measures, potential accidental impacts from the CPA proposed action are expected to cause little damage to ecological or biological function of these communities.

If dispersants are applied to an oil spill or if oil is ejected under high pressure, oil would mix into the water column, be carried by underwater currents, and eventually contact the seafloor in some form, either concentrated (near the source) or decayed (farther from the source), where it may impact patches of chemosynthetic community habitat in its path. As with sediments, the farther the dispersed oil travels, the more diluted the oil will become as it mixes with surrounding water.

There is some reason to believe that chemosynthetic organisms possess natural adaptations to contact with oil because these communities live among natural oil and gas seeps; however, natural seepage is very constant and occurs at very low rates as compared with the potential volume of oil released from a loss of well control or pipeline rupture. In addition, organisms inhabit certain niches within the gradients found at oil seeps, choosing locations with enough hydrocarbons to sustain their metabolism but not enough to be toxic. All seep organisms also require unrestricted access to oxygenated water at the same time as exposure to hydrocarbon energy sources. Oil plumes that contact the seafloor before they degrade could potentially affect sensitive benthic communities if they happen to encounter such a habitat in a localized area. The coating of organisms with oil could cause mortality or sublethal effects.

Accidental impacts associated with the CPA proposed action would likely result in only minimal impacts to chemosynthetic communities with adherence to the distancing guidance provided in NTL 2009-G40.

Cumulative Impacts

Cumulative factors considered to impact the chemosynthetic communities of the Gulf of Mexico include both OCS oil- and gas-related and non-OCS oil- and gas-related activities. Cumulative OCS oil- and gas-related impacts to deepwater communities in the Gulf of Mexico are considered negligible because of the application of distancing mitigations applied to permits. The most serious, impact-producing factor threatening chemosynthetic communities is physical disturbance of the seafloor, which could destroy the organisms of these communities. Such disturbance would most likely come from those OCS oil- and gas-related activities associated with pipelaying, anchoring, structure emplacement, and seafloor loss of well control events. Drilling discharges and resuspended sediments have a potential to cause minor, mostly sublethal impacts to chemosynthetic communities, but substantial sediment accumulations could result in more serious impacts. Possible catastrophic oil spills (**Appendix B**) due to seafloor loss of well control have the potential to devastate localized deepwater benthic habitats. This

could occur in the case of a low-probability catastrophic spill combined with the application of dispersant or high-pressure ejection of oil, producing the potential to cause devastating effects on local patches of habitat in the path of subsea plumes where they physically contact the seafloor. The possible impacts, however, will be localized due to the directional movement of oil plumes by the water currents and because the sensitive habitats have a scattered, patchy distribution. Oil plumes that remain in the water column for longer periods would disperse and decay, having only minimal effect. However, a low-probability catastrophic spill is not part of the CPA proposed action and not likely expected to occur, and if it did, it would only affect a small portion of the sensitive benthic habitat in the Gulf of Mexico.

The non-OCS oil- and gas-related, impact-producing factors include activities such as commercial fishing (e.g., long lines and bottom trawling), storm impacts, and climate change. As with deepwater coral communities (Hourigan, 2014), fishing and trawling could potentially crush, topple, and remove chemosynthetic communities in the path of the gear. Because of the water depths where chemosynthetic communities live (>300 m; 984 ft) and because of the relatively low density of potentially commercially valuable fishery species at these depths, these activities are not expected to substantially impact deepwater benthic communities. However, if trawling were to occur on a chemosynthetic community, the community could be devastated. Regional and global impacts from climate change, such as ocean acidification and temperature change, are not expected to have noticeable impacts to GOM deepwater habitats in the immediate future, but they are a potential concern over the long term (Lunden et al., 2013 and 2014). Overall, non-OCS oil- and gas-related activities are not expected to greatly impact chemosynthetic communities, and the incremental contribution of the CPA proposed action to cumulative impacts is expected to be negligible to minor due to the proposed mitigations.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS

A broad Internet search for relevant new information and scientific journal articles made available since publication of the prior 2012-2017 Gulf of Mexico EISs was conducted using the Internet and interlibrary loan acquisition.

Because research specific to chemosynthetic organisms is limited, it can be useful to consider research regarding impacts relevant to deepwater corals, especially those associated with seeps that can be included in the broader definition of a chemosynthetic community, such as *Callogorgia delta*. Such research is presented here as potentially relevant with the major caveat that experiments were not performed on chemosynthetic organisms themselves and results could very well be different.

DeLeo et al. (2015) performed laboratory tests on the effects of (1) bulk oil-water mixtures, (2) water-accommodated oil fractions, (3) the chemical dispersant COREXIT 9500A, and (4) a combination of hydrocarbons and dispersants on representative living samples of three species of northern GOM corals (i.e., *Paramuricea* type B3, *Callogorgia delta*, and *Leiopathes glaberrima*) obtained in the field at depths of 500-1,100 m (1,640-3,609 ft). Samples were exposed for a 96-hour period. All species showed greater health declines in response to dispersant alone (2.3-3.4 fold) and to the oil-dispersant mixtures (1.1-4.4 fold) than in the oil only treatments, which did not result in mortality. *C. delta*, which is found in increased abundance near natural hydrocarbon seeps and may have some natural adaptation to short-term oil exposure, showed less severe health declines than the other two species in response to oil and oil/dispersant mixtures. It can be reasonably concluded that chemosynthetic organisms such as tubeworms and bivalves, which intentionally consume hydrocarbons, would possess similar adaptations to naturally occurring levels of oil.

COREXIT 9500A was created with hopes of reducing its toxicity when compared with older formulations, but the DeLeo et al. study demonstrates continued toxic effects. Much is still unknown (DeLeo et al., 2015), including the extent to which laboratory conditions and concentrations are analogous to likely field conditions, and these results may not be applicable to all deepwater coral species or to all chemosynthetic organisms. However, given the clear results in the study, the authors advise caution regarding application of chemical dispersants at depth, where dispersants and dispersant/oil mixtures could remain in contact with coral or chemosynthetic organisms for long periods of time and seem likely to induce greater impacts than oil exposure alone.

This study provides important information regarding the application of chemical dispersants at depth, as was performed during the *Deepwater Horizon* oil-spill response. However, that method of application

was unprecedented and likely unique to a catastrophic level spill. For the types of small, noncatastrophic accidental spill events that are reasonably foreseeable with the CPA proposed action, the use of dispersants at depth is not anticipated. Moreover, the results of experiments on deepwater coral may not apply to chemosynthetic organisms. Therefore, this new research does not alter the previous impact level conclusions of the prior 2012-2017 Gulf of Mexico EISs.

In another study, Valentine et al. (2014) found evidence of an area of approximately 3,200 km² (1,236 mi^2) around the *Macondo* well contaminated by ~1,800 kg (±1,000 kg) (~3,968 lb [±2,205 lb]) of excess hopane (a tracer for crude oil), reflecting deposition of oil from the *Deepwater Horizon* explosion and oil spill. Based on maps of the contaminated area presented by Valentine et al., compared with the Bureau of Ocean Energy Management's GIS database, it appears likely that some chemosynthetic communities may have been within the contamination footprint, although damage to chemosynthetic communities in the vicinity of the *Macondo* well has not been reported to date (Shedd, official communication, 2015). This study provides evidence that there could have been impacts to chemosynthetic communities that have yet to be documented, but this does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs.

The NRDA Trustees' recently published Final PDARP/PEIS provides a series of findings about benthic resources impacts (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Final PDARP/PEIS identified *Deepwater Horizon* injuries to benthic organisms (including hard and soft corals, small invertebrates, crabs, and fish) that rely on benthic habitats. The Trustees also documented the most severe impacts, i.e., both physical and from exposure to oil, dispersants, and oil-associated marine snow, in an area approximately 11 mi^2 (28 km^2) from the wellhead, as well as the chemical impact in an area of over 490 mi^2 (1,269 km^2) (also refer to Montagna et al., 2013). In general, the interpretive analyses in the Trustees' Final PDARP/PEIS echo the substance of BOEM's analyses in the prior 2012-2017 Gulf of Mexico EISs about the extent of *Deepwater Horizon* chemical impacts, such as the analysis of Valentine et al. (2014) and other *Deepwater Horizon* oil spill-related publications; therefore, this additional information does not alter the conclusions of the prior 2012-2017 Gulf of Mexico EISs.

Our search did not reveal any other relevant new studies that would alter the analyses or conclusions of the prior 2012-2017 Gulf of Mexico EISs.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. Even with the recent publication of the Final PDARP/PEIS, there remains incomplete or unavailable information on the effects of the *Deepwater Horizon* explosion, oil spill, and response on chemosynthetic communities that could potentially be relevant to reasonably foreseeable significant adverse impacts. Ongoing research projects funded by NOAA and the National Science Foundation are investigating these impacts. Some of this information cannot reasonably be obtained because the long-term effects may not yet be detectable and the means to obtain it are unknown. This unavailable information may be relevant to adverse effects because it could provide an example of adverse impacts directly caused by a loss of well control event.

Existing information suggests that chemosynthetic communities did not experience significant adverse impacts from the *Deepwater Horizon* explosion, oil spill, and response. Numerous cruises using research ships, submersibles, and drift cameras investigated the seafloor in the area surrounding the well site (USDOC, NOAA, 2011a and 2011b). As detailed above, damage to chemosynthetic communities in the vicinity of the *Macondo* well has not been reported to date (Shedd, official communication, 2015). Therefore, it has not been demonstrated that even a catastrophic oil spill would have significant adverse impacts or change the baseline for chemosynthetic communities in the Gulf of Mexico. Even if this incomplete or unavailable information becomes available and ultimately demonstrates that such communities in the vicinity of the *Macondo* well have been severely impacted by the *Deepwater Horizon* explosion, oil spill, and response, BOEM has determined that the information is not essential to a reasoned choice among alternatives. Even if some impacts did occur, chemosynthetic communities are found throughout the Gulf in patchy distributions, thus minimizing the proportion of the total that would be likely to be impacted by any single event.

BOEM has also identified incomplete or unavailable information regarding the abundance and distribution of chemosynthetic communities in the GOM. Current understanding of the relationship between reflectivity of the seafloor and occurrence of potential habitat for chemosynthetic communities is used by BOEM to assess whether such communities occur in the vicinity of proposed OCS oil- and gas-related activities. Similarly, side-scan sonar data are also used to determine the presence of likely habitat. These and other data are used to implement distance requirements to protect these communities. Incomplete or unavailable information could change our understanding of what signatures from such data sources indicate. Development of improved data or methods could help in determining where chemosynthetic communities occur. Such information could be used by BOEM to reduce impacts to these communities. Available scientifically credible information has been applied by BOEM's subject-matter experts using accepted scientific methodologies. The confirmed presence of chemosynthetic communities in areas predicted to have likely habitat via reflectivity or side-scan sonar data indicates that BOEM is currently able to effectively protect these communities from OCS oil- and gas-related activities. Therefore, BOEM has determined that the information is not essential to a reasoned choice among alternatives because existing information has shown that current methods provide for an appropriate means for protecting these communities.

Summary and Conclusion

BOEM has reexamined the analysis for chemosynthetic communities presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusions for chemosynthetic communities presented in those NEPA documents. The analysis and potential impacts detailed in those documents still apply for proposed CPA Lease Sale247.

4.1.1.10. Nonchemosynthetic Deepwater Benthic Communities

BOEM has reexamined the analysis for nonchemosynthetic deepwater benthic communities (also termed "deepwater coral communities") presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for nonchemosynthetic deepwater benthic communities presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.10 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.10 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.10 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors on nonchemosynthetic deepwater benthic communities of the CPA are bottom-disturbing activities associated with anchoring, structure emplacement, pipelaying, structure removal, and discharges of drill cuttings, muds, and produced water. The application of avoidance criteria for deepwater benthic communities provided as guidance in NTL 2009-G40, "Deepwater Benthic Communities," typically precludes the placement of a well within 610 m (2,000 ft) of any suspected site of a deepwater benthic community. Considerable mechanical damage could be inflicted upon sensitive nonchemosynthetic deepwater benthic communities by routine OCS drilling activities associated with the CPA proposed action if mitigations are not applied to permits. Deepwater live bottom communities, primarily structured by the coral *Lophelia pertusa*, are the nonchemosynthetic deepwater benthic communities that would be sensitive to impacts from OCS oil- and gas-related activities.

Bottom-disturbing activities associated with anchoring, structure emplacement, pipelaying, and structure removal cause localized bottom disturbances and disruption of benthic communities in the

immediate area. If a sensitive community is subjected to direct impacts by bottom-disturbing activities, potentially severe or catastrophic impacts could occur due to raking of the sea bottom by anchors and anchor chains and partial or complete burial by muds and cuttings. The severity of such an impact is such that there would be incremental losses of productivity, reproduction, community relationships, and overall ecological functions of the local community, and incremental damage to ecological relationships with the surrounding benthos. Should this occur, it could result in recovery times on the order of decades or more with the possibility of the community never recovering (Food and Agriculture Organization of the United Nations, 2008; Jones, 1992; Probert et al., 1997). However, impacts from bottom-disturbing activities directly on deepwater coral communities are expected to be rare because of the application of required protective measures as guidance provided in NTL 2009-G40, "Deepwater Benthic Communities."

Routine discharge of drill cuttings with associated muds can also affect the seafloor. In deep water, as opposed to shallower areas on the continental shelf, discharges of drilling fluids and cuttings at the sea surface are spread across broad areas of the seafloor and are generally distributed in thinner accumulations. A deepwater effects study funded by this Agency included determinations of the extent of muds and cuttings accumulations in approximately 1,000 m (3,281 ft) of water (CSA, 2006). Geophysical and chemical measurements indicated that a layer of cuttings and muds several centimeters thick was deposited within a 500-m (1,640-ft) radius of well sites. This suggests that the required 2,000-ft (610-m) distance would protect deepwater benthic communities from impacts. Discharges of produced waters on the sea surface, chemical spills, and deck runoff would be diluted in surface waters, having no effect on seafloor habitats.

Routine activities associated with the CPA proposed action are not expected to cause damage to the ecological function or biological productivity of sensitive nonchemosynthetic deepwater benthic communities (deepwater coral reefs) due to the consistent application of BOEM's protection guidance provided in NTL 2009-G40. Information included in required hazards surveys for OCS oil- and gas-related activities depicts areas that could potentially harbor nonchemosynthetic communities. This allows BOEM to require avoidance of any areas that are conducive to the growth of sensitive hard bottom communities. The same geophysical conditions associated with the potential presence of chemosynthetic communities also results in the potential occurrence of hard carbonate substrate and other associated, nonchemosynthetic deepwater benthic communities. Because of the required avoidance criteria, these communities are generally avoided in exploration and development planning and in bottom-disturbing activities. Impacts on sensitive deepwater communities from routine activities associated with the CPA proposed action would be minimal to none.

Accidental disturbances resulting from the CPA proposed action, including oil spills, have the potential to result in impacts to nonchemosynthetic deepwater benthic communities of the CPA. Accidental events that could impact nonchemosynthetic deepwater benthic communities are primarily limited to seafloor loss of well control. A loss of well control at the seafloor could create a crater and could resuspend and disperse large quantities of bottom sediments. This would destroy any organisms located nearby via burial or modification of narrow habitat quality requirements. Substantial impacts on these communities could permanently prevent reestablishment, particularly if hard substrate required for recolonization is buried by resuspended sediments from a loss of well control. Physical disturbance or destruction of a limited area of benthos or to a limited number of megafauna organisms (e.g., brittle stars, sea pens, and crabs) would not result in a major impact to the deepwater benthos ecosystem as a whole or even in relation to a small area of the seabed within a lease block. The application of avoidance criteria for deepwater coral communities as provided as guidance in NTL 2009-G40 precludes the placement of a well within 2,000 ft (610 m) of any suspected site of a deepwater coral community, thereby distancing the community from sedimentation that might result from a loss of well control event.

Accidental impacts due to oil spills associated with the CPA proposed action would likely result in only minimal impacts to nonchemosynthetic communities with adherence to the required avoidance measures. A loss of well control could result in a low-probability catastrophic spill (**Appendix B**), which is not part of the CPA proposed action and not likely expected to occur. If there were such an occurrence, the distancing requirements would tend to lessen but not necessarily eliminate impacts. A large subsea spill combined with the application of dispersant or high-pressure ejection of oil could mix oil into the water column, resulting in a subsea plume. Such a plume could potentially cause severe effects on local patches of habitat in its path where it physically contacts the seafloor. If such an event were to occur, it could take decades to reestablish the nonchemosynthetic community in that location. The possible impacts, however, would be localized due to the directional movement of an oil plume by the water

currents and because the sensitive habitats have a scattered, patchy distribution. As with sediments, the farther the dispersed oil travels, the more diluted it would become as it mixes with the surrounding water, and bacteria would also degrade the oil over time (and distance). Oil plumes that remain in the water column for longer periods would disperse and decay, having only minimal effects.

Cumulative Impacts

Cumulative factors considered to impact the deepwater benthic communities (>300 m; 984 ft) of the Gulf of Mexico include both OCS oil- and gas-related and non-OCS oil- and gas-related activities. The OCS oil- and gas-related activities associated with pipelaying, anchoring, structure emplacement, drilling discharges, and seafloor loss of well control have the potential to impact nonchemosynthetic deepwater benthic communities. The most serious, impact-producing factor threatening nonchemosynthetic communities is physical disturbance of the seafloor, which could destroy the organisms of these communities. Such disturbance would most likely come from those OCS oil- and gas-related activities associated with pipelaying, anchoring, and structure emplacement. Anchoring and pipeline and structure emplacement have the potential to crush deepwater benthic communities. Drilling discharges and resuspended sediments have the potential to cause minor, mostly sublethal impacts to nonchemosynthetic communities, but substantial accumulations could result in more serious impacts. Possible effects of an oil spill could range from no discernible effect (for highly dispersed oil undergoing biodegradation), reduced growth, interruption of reproductive cycles, loss of gamete viability, tissue damage, death of affected organisms, up to a noticeable reduction in the distribution of species, depending on the amount and duration of contamination. Major impacts to localized benthic habitat are possible in the event of a low-probability catastrophic loss of well control on the seafloor (refer to **Appendix B** for more details). However, a low-probability catastrophic spill is not part of the CPA proposed action and not likely expected to occur. Therefore, cumulative impacts to deepwater communities in the Gulf of Mexico are considered negligible because of the application of the avoidance criteria described in NTL 2009-G40 that distances bottom-disturbing activities from sensitive habitats.

Non-OCS oil- and gas-related activities include commercial fishing (e.g., long lines and bottom trawling), storm impacts, and climate change. Among the activities unrelated to the OCS Program (non-OCS oil and gas impact-producing factors), fishing and trawling represent the greatest possible threat to nonchemosynthetic communities and associated fish communities as a result of habitat destruction and overfishing (Kaiser, 2004). Bottom-contacting fishing gear could potentially crush, topple, and remove nonchemosynthetic communities in the path of the gear. The impacts on deepwater fisheries in the GOM associated with deepwater coral habitat as a result of trawling activity are a serious concern (Hourigan, 2014), but because of the water depths (>300 m; 984 ft) and the low density of potentially commercially valuable fishery species in areas associated with these communities, fishing and trawling are not expected to severely impact deepwater benthic communities. Regional and global impacts from climate change, such as ocean acidification and temperature change, are not expected to have noticeable impacts to GOM deepwater habitats in the immediate future, but they are a concern over the long term (Lunden et al. 2013 and 2014). Storms cause little to no impacts at the depths (>300 m; 984 ft) that nonchemosynthetic communities occur. A storm could potentially cause an accident that could then cause secondary impacts, such as sinking vessels that could crush nonchemosynthetic communities, but such occurrences are highly improbable given the scattered and patchy distribution of nonchemosynthetic communities. State oil and gas activities are not expected to impact deepwater benthic communities due to the great distance between such activities and water depths >300 m (984 ft).

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search for relevant new information was conducted using the Internet and interlibrary loan acquisition of relevant publications. New information was found about the potential impacts from exposure to oil, chemical dispersants, and dispersant/oil mixtures.

Valentine et al. (2014) found evidence of an area of approximately 3,200 km² (1,236 mi^2) around the *Macondo* well contaminated by ~1,800 kg (±1,000 kg) (~3,968 lb [±2,205 lb]) of excess hopane (a tracer for crude oil), reflecting deposition of oil from the *Deepwater Horizon* explosion and oil spill. Based on

maps of the contaminated area presented by Valentine et al., compared with the Bureau of Ocean Energy Management's GIS database, it appears that some deepwater benthic communities may have been within the contamination footprint (Shedd, official communication, 2015). Following up on White et al.'s (2012) documentation of a deepwater coral community impacted by oil from the *Deepwater Horizon* oil spill, Fisher et al. (2014) described two additional deepwater coral communities with negative impacts attributed to the *Deepwater Horizon* oil spill, i.e., in Mississippi Canyon Block 297 (6 km [4 mi] south of the *Macondo* wellhead) and in Mississippi Canyon Block 344 (22 km [14 mi] southeast of the *Macondo* wellhead). Numerous other deepwater coral communities investigated by Fisher et al. (2014) since the spill were found to be healthy. White et al. (2014) found the anionic surfactant DOSS (dioctyl sodium sulfosuccinate) persisting for at least 6 months in sediments taken from within a deepwater coral community, although that study did not measure toxicity. These studies provide evidence that there could have been additional impacts to deepwater benthic communities that have yet to be documented, but they do not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs.

DeLeo et al. (2015) performed laboratory tests on the effects of (1) bulk oil-water mixtures, (2) water-accommodated oil fractions, (3) the chemical dispersant COREXIT 9500A, and (4) a combination of hydrocarbons and dispersants on representative living samples of three species of northern GOM corals (i.e., *Paramuricea* type B3, *Callogorgia delta*, and *Leiopathes glaberrima*) obtained in the field at depths of 500-1,100 m (1,640-3,609 ft), exposing the samples for a 96-hour period. All species showed greater health declines in response to dispersant alone (2.3-3.4 fold) and to the oil-dispersant mixtures (1.1-4.4 fold) than in the oil only treatments, which did not result in mortality. *C. delta*, which is found in increased abundance near natural hydrocarbon seeps and may have some natural adaptation to short-term oil exposure, showed less severe health declines than the other two species in response to oil and oil/dispersant mixtures. Much is still unknown (DeLeo et al., 2015), including the extent to which laboratory conditions and concentrations are analogous to likely field conditions, and these results may not be applicable to all deepwater coral species. However, given the clear results in the study, the authors advise caution regarding the application of chemical dispersants at depth, where dispersants and dispersant/oil mixtures could remain in contact with coral for long periods of time and seem likely to induce greater impacts than oil exposure alone. This study provides important information that should inform future decisions regarding the application of chemical dispersants at depth, as was performed during the *Deepwater Horizon* oil-spill response. However, that method of application was unprecedented and likely unique to a catastrophic-level subsea spill. For the types of small, noncatastrophic accidental spill events that are reasonably foreseeable in the CPA proposed action, the use of dispersants at depth is not anticipated.

Other new information was found in the NRDA Trustees' recently published Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Trustees identified injuries to hard and soft corals, small invertebrates, crabs, and fish that rely on benthic habitats, including injuries to nonchemosynthetic community as previously documented in earlier studies cited in BOEM's previous Gulf of Mexico EISs (e.g., White et al., 2012; Hsing et al., 2013; Fisher et al., 2014). The Trustees also documented the presence of oil constituents (polycyclic aromatic hydrocarbons [PAHs]) in megafauna collected from the deep seafloor and detected chemical degradation of sediments occurring in decreasing severity in concentric zones extending outward from the wellhead (see also Montagna et al., 2013). While the Final PDARP/PEIS provides additional interpretative analyses that was duly considered, it does not alter the conclusions of the prior 2012-2017 Gulf of Mexico EISs.

Incomplete or Unavailable Information

Even after evaluating the new information above, BOEM has determined that the new information does not change the conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in this Supplement EIS and in Chapter 4.2.1.10 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.10 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, BOEM has identified incomplete or unavailable information for impacts related to the following: locations of deepwater corals in the Gulf of Mexico; toxicity of oil to deepwater corals; secondary impacts on associated deepwater fish communities; and impacts from the *Deepwater Horizon* explosion, oil spill, and response on nonchemosynthetic deepwater benthic communities that may be relevant to reasonably foreseeable significant adverse impacts. Even with the recent publication of the Final

PDARP/PEIS, BOEM recognizes that incomplete information remains with respect to possible impacts to nonchemosynthetic deepwater benthic communities in the CPA as a result of the *Deepwater Horizon* explosion, oil spill, and response.

At present, the best available information does not provide data for a complete understanding of these four data gaps. BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. BOEM's database of known deepwater benthic communities is incomplete. This database is used when deepwater exploration and development plans are reviewed to ensure that deepwater corals are not impacted by OCS oil- and gas-related activities. In order to fill this data gap, BOEM's subject-matter experts identify probable habitat for deepwater corals using a database of 3D seismic data, which provides the locations of 28,000 features that could represent such communities, in conjunction with side-scan sonar data and site-specific, high-resolution surveys to identify sensitive habitat and communities. BOEM's database of 3D seismic anomalies is well suited to the identification of general areas in which favorable coral habitat may occur and is sufficient in assisting BOEM in identifying areas that should be avoided for OCS oil- and gas-related activities. However, these surveys may not be sufficiently high resolution for the identification of small, scattered hard substrate, as discussed by Quattrini et al. (2013) and as analyzed in the CPA 241/124 and EPA 226 Supplemental EIS. Small patches of shell and rubble substrate are commonly observed in soft bottom habitat near active and inactive seep sites, which frequently occur in areas targeted for OCS oil- and gas-related activities. If data are sparse or indicate additional detail is warranted, this data gap may be additionally filled by site-specific video or photographic surveys to obtain this information. Despite these procedures, some communities scattered throughout predominantly soft bottom habitat may still be impacted if seafloor surveys do not suggest deepwater coral habitat is present. However, BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives because BOEM reviews plans on a case-by-case basis to reduce the possibility of impacting deepwater coral habitat.

Information on the toxic impacts of oil on deepwater corals is still incomplete. A previous investigation of several deepwater octocorals and their association with oil seeps indicated that one species was found in association with oil seeps. The results of this study indicate that this coral could "possess mechanisms for dealing with natural levels of exposure to hydrocarbons" (Quattrini et al., 2013), and a previous study by Al-Dahash and Mahmoud (2013) suggested a possible mechanism for this to be coral harboring of symbiotic oil-degrading bacteria. The new research by DeLeo et al. (2015) corroborates this finding for one species (*Callogorgia delta*) commonly associated with seeps. Such an adaptation could result in resilience after exposure to oil from a loss of well control. It is possible that, if this coral may be tolerant of some oil exposure, other species may be as well; however, that information is not known at this time. BOEM has determined that the unavailable information on the tolerance of deepwater corals to oil exposure is not essential to a reasoned choice among alternatives because BOEM requires that OCS oil- and gas-related activities are sufficiently distanced from wells and because exposure from accidental events is unlikely.

Harm to nonchemosynthetic deepwater benthic communities as a result of bottom trawling is thought to present a serious threat (Hourigan, 2014). In place of unavailable information on commercial fishing impacts on deepwater fisheries in areas of deepwater coral habitat, existing information on commercial fishing activity in the deep GOM shows that, unlike other areas in the Atlantic Ocean and in Europe, bottom-fishing and trawling efforts in the deeper water of the CPA are currently minimal, and areas where royal red shrimp are trawled are in soft bottom communities (CSA, 2002). The primary Gulf of Mexico royal red shrimp trawling grounds are found in the upper continental slope off the Mississippi Delta (CSA, 2002). Grounds there are blue-black terrigenous silt and greenish mud, and any areas that fishermen know to be hard bottom (potential nonchemosynthetic communities) are not targeted because of the likelihood of lost/damaged trawling gear (CSA, 2002). Also, nonchemosynthetic communities are widely distributed in the Gulf of Mexico, mostly outside the narrowly distributed area of royal red shrimp grounds. Therefore, impacts on such communities as a whole are expected to be negligible. In conclusion, available information consistent with acceptable scientific reasoning shows that commercial fishing impacts on nonchemosynthetic deepwater benthic communities are expected to cause only negligible impacts.

BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives because nonchemosynthetic deepwater benthic communities are found throughout the Gulf of Mexico and are in patchy distributions, minimizing the number that would be likely to be impacted by

any single event. Available scientifically credible information has been applied by BOEM's subject-matter experts using accepted scientific methodologies. Published information (e.g., White et al., 2012; Fisher et al., 2014) indicates that, even though multiple coral communities in the vicinity of the *Macondo* well were impacted by oil from the *Deepwater Horizon* oil spill, the impact to the overall population of coral communities of the GOM was relatively minor.

Summary and Conclusion

BOEM has reexamined the analysis for nonchemosynthetic deepwater benthic communities presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. The potential for effects from changes to the affected environment (post-*Deepwater Horizon*), routine activities, accidental spills (including low-probability catastrophic spills), and cumulative impacts remains whether or not the No Action or an Action alternative is chosen under this Supplemental EIS. Impacts on nonchemosynthetic deepwater benthic communities from either smaller accidental events or low-probability catastrophic events will remain the same. No new significant information was discovered that would alter the impact conclusion for nonchemosynthetic communities presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.11. Soft Bottom Benthic Communities

BOEM has reexamined the analysis for soft bottom benthic communities presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for soft bottom benthic communities presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of soft bottom benthic communities and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.11 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.11 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.11 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors include seafloor disturbances (e.g., anchoring, trenching, infrastructure emplacement, and infrastructure removal), waste discharge (e.g., drilling muds and cuttings from oil and gas operations), and resuspension of sediments (e.g., pipeline burial and decommissioning operations). Disturbances of soft bottom benthic communities cause localized disruptions to benthic community composition and an alteration in food sources for some large invertebrate and finfish species. Analysis of these routine activities has identified only localized and short-term impacts to soft bottom benthic communities. Any activity that may affect the soft bottom communities would only impact a small portion of the overall area of the seafloor of the Gulf of Mexico. Because the soft bottom substrate is ubiquitous throughout the Gulf of Mexico, there are no lease stipulations to avoid these communities; however, other routine practices restrict detrimental activities that could cause undue harm to benthic habitats (e.g., discharge restrictions, debris regulations, and NPDES permits).

Accidental disturbances to soft bottom benthic communities can result from oil spills associated with OCS oil- and gas-related activities. Because of the proportionately small area that OCS oil- and gas-related activities occupy on the seafloor, only a very small portion of Gulf of Mexico soft bottom benthic communities would experience impacts as a result of oil spills. The greatest impacts would likely occur closest to the source of the spill, and impacts would rapidly decrease with increased distance from the source. Contact with spilled oil outside the vicinity of the event would likely cause sublethal to negligible effects to benthic invertebrates and finfishes. Oil deposited on soft bottom benthic communities could

result in changes to local community structure. The organic enrichment of impacted sediments may result in altered sediment communities as bacteria degrade deposited organic matter. This response can lead to hypoxic conditions and a series of altered community structures until the organic matter is depleted and surface sediments return to an oxygenated state (Neff, 2005). Although an oil spill could have some detrimental impacts, especially closest to the occurrence of the spill, the impacts may be within the range of natural fluctuations (Clark, 1982), and impacts would affect a relatively small portion of the seafloor.

Cumulative Impacts

The cumulative analysis considers impacts resulting from ongoing routine oil and gas operations, as well as those resulting from past and future OCS leasing. These impacts include seafloor disturbances, waste discharge, and resuspension of sediments. Potential non-OCS oil- and gas-related disturbances include storms, sand mining, trawling, State oil and gas activities, and hypoxia.

Although OCS oil- and gas-related activities may have locally devastating impacts, impacted communities are repopulated relatively quickly and the cumulative effect on the overall seafloor and benthic communities would be negligible. Long-term OCS oil- and gas-related activities are not expected to adversely impact the entire soft bottom environment of the GOM because the locally impacted areas are small in comparison with the entire area of the GOM. For information on impacts resulting from events outside the scope of routine activities and accidental events, refer to **Appendix B**.

Non-OCS oil- and gas-related disturbances are likely to impact the soft bottom communities more frequently than do OCS oil- and gas-related activities. In some areas, soft bottom benthic communities remain in an early successional stage due to the frequency of natural and anthropogenic disturbances. The incremental contribution of the CPA proposed action to the cumulative impact is expected to be negligible.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

BOEM has examined newly available information for findings that may affect the analyses of routine activities, accidental events, and cumulative impacts of OCS oil- and gas-related activities and potentially alter previous conclusions. A search of Internet information sources and scientific journals was conducted to determine the availability of recent information (including ACS Publications, BioOne, EBSCO, Elsevier, the Gulf of Mexico Fishery Management Council's website, JSTOR, NMFS's databases, NOAA's Gulf Spill Restoration Publications website, PLoS ONE, Science Direct, and SeaGrant website). This search revealed that new information relevant to an analysis of the potential impacts of OCS oil- and gas-related activities on soft bottom benthic communities has been published.

New studies document that community structure of microbial, meiofaunal, and macrofaunal communities can be influenced by the presence of oil (Main et al., 2015; Baguley et al., 2015; Qu et al., 2015). Main et al. (2015) found that deep-sea benthic microbial communities had increased oxygen consumption rates in response to hydrocarbon contamination. Bacterial biomass decreased, community structure changed in response to the contamination, and the data suggested a possible increase in hydrocarbon degraders. Baguley et al. (2015) studied meiofaunal deep-sea, soft-sediment community response to the *Deepwater Horizon* explosion and oil spill. They found that nematode dominance increased with proximity to the spill site and that copepod abundance decreased. Diversity and relative species abundance also decreased with proximity to the oil source. Qu et al. (2015) studied the community response of macrobenthos in sediments located from 5 to 9 km (3 to 6 mi) from the site of the *Deepwater Horizon* explosion and oil spill. Numbers of species, abundance, and diversity declined relative to pre-spill values, although the concentration of oil in the sediments remained low. Katsiaras et al. (2015) studied impacts to soft bottom macrofauna from dredged material disposal. High concentrations of hydrocarbons associated with the dredged material impacted the macrofaunal community, which was reflected in species number, abundance, and toxicity levels. Burial and smothering affected a diverse and abundant community, resulting in an almost azoic state. Similar impacts could be expected from the discharge of drilling muds and cuttings, although high concentrations of hydrocarbons are not common in such discharges. The NRDA Trustees' recently published Final PDARP/PEIS provides a series of findings about benthic resources impacts of the *Deepwater Horizon* oil

spill (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Trustees' injury assessment described concentric zones of injury severity for benthic resources with the most severe impacts, including a reduction in diversity and abundance, within an inner zone of 11 mi^2 (28 km^2) around the *Macondo* wellhead. Reductions in diversity were also documented in concentric zones located 75 and 306 mi (121 and 492 km) from the wellhead, but to a lesser extent than the zone located closest to the wellhead. Chemical degradation of the seafloor was detected as far as 490 mi^2 (1,269 km^2) around the wellhead in an area identified as the fourth concentric zone (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

Based on the new information presented in this Supplement EIS and in the prior 2012-2017 Gulf of Mexico EISs' analyses, which indicated that only a small portion of the GOM seafloor and associated benthic organisms would be impacted by oil exposure, BOEM concludes that population-level responses are not realistically expected.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the conclusions from the prior 2012-2017 Gulf of Mexico EISs are still valid because no new significant information on soft bottom benthic communities has been published since those NEPA documents were published; nevertheless, there is still incomplete or unavailable information, such as the abundance of deepwater corals in areas of predominantly soft bottom habitat, how the impacts of trawling affect soft bottom communities, how long it takes for recovery, and how the area impacted compares with that from OCS oil- and gas-related activities. As discussed in the prior 2012-2017 Gulf of Mexico EISs, BOEM has identified incomplete or unavailable information regarding soft bottom benthic communities.

The cumulative impacts of OCS oil and gas exploration and development may result in locally significant impacts to soft bottom benthic communities. However, soft bottom communities are abundant throughout the GOM and the area of the seafloor impacted by OCS oil- and gas-related activities is very small in comparison with the overall area of soft bottom habitat in the GOM. Analysis of available information did not identify any reasonably foreseeable impacts extending beyond localized responses to oil contamination or sedimentation events among soft bottom inhabitants. Although additional information regarding impacts to soft bottom benthic communities and potential changes in baseline conditions may be in development, research to date does not suggest Gulfwide impacts should be expected. Relevant data regarding the status and function of soft bottom benthic communities directly impacted by OCS oil- and gas-related activity, including that being developed through the NRDA process, may take years to acquire and analyze and cannot be obtained within the timeline contemplated in the NEPA analysis of this Supplemental EIS.

BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing the analysis of impacts to soft bottom benthic communities and subsequent recovery. The new information summarized above indicates that microbial, meiofaunal, and macrofaunal soft bottom benthic communities transition rapidly when exposed to oil contamination of the sediment (Main et al., 2015; Baguley et al., 2015; Qu et al., 2015; Katsiaras et al., 2015). Although the body of available information is incomplete and long-term effects cannot yet be known, the evidence currently available supports past analyses and does not indicate severe adverse impacts to the soft bottom benthic communities of the CPA or entire GOM as a result of OCS oil- and gas-related activities. Therefore, BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for soft bottom benthic communities presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for soft bottom benthic communities presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.12. Marine Mammals

BOEM has reexamined the analysis for marine mammals presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for marine mammals presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.12 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.12 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.12 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Operators must adhere to certain NTLs while conducting OCS oil- and gas-related activities in order to reduce impacts to marine mammals. The operator's reaffirmed compliance with NTL 2012-JOINT-G01 ("Vessel Strike Avoidance and Injured/Dead Protected Species Reporting") and NTL 2015-BSEE-G03 ("Marine Trash and Debris Awareness and Elimination"), as well as the limited scope, timing, and geographic location of the CPA proposed action, would result in negligible effects from the proposed drilling activities on marine mammals. In addition, NTL 2012-JOINT-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program," minimizes the potential of harm from seismic operations to marine mammals. These mitigations include onboard observers, airgun shut-downs for whales in the exclusion zone, ramp-up procedures, and the use of a minimum sound source.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors on marine mammals of the CPA are the degradation of water quality from operational discharges; noise generated by aircraft, vessels, operating platforms, and drillships; vessel traffic; explosive structure removals; seismic surveys; and marine debris from service vessels and OCS oil- and gas-related facilities. Some routine activities related to the CPA proposed action have the potential to have adverse, but not significant, impacts to marine mammal populations in the Gulf of Mexico. Impacts from vessel traffic, structure removals, and seismic activity could negatively impact marine mammals by increasing noise levels as well as having the potential to harm or harass marine mammal species. These activities, when mitigated as required by BOEM, BSEE, and NMFS, are not expected to have long-term impacts on the size and productivity of any marine mammal species or population. Mitigations reduce the risk of harassing or harming marine mammal species. Other routine activities such as OCS oil- and gas-related aircraft activity, drilling and production noise, discharges, and marine debris are expected to have negligible effects.

Accidental disturbances resulting from the CPA proposed action, including small oil spills and spill-response activities, have the potential to have adverse, but not significant impacts on marine mammal populations of the CPA. Characteristics of impacts (i.e., acute vs. chronic impacts) depend on the magnitude, frequency, location, and date of accidents; characteristics of spilled oil; spill-response capabilities and timing; and various meteorological and hydrological factors. Oil spills may cause chronic (long-term lethal or sublethal oil-related injuries) and acute (spill-related deaths occurring during a spill) effects on marine mammals. Long-term effects include decreases in prey availability and abundance because of increased prey mortality rates, change in age-class population structure because certain year-classes were impacted more by oil, decreased reproductive rate, and increased rate of disease or neurological problems from exposure to oil (Harvey and Dahlheim, 1994). The effects of cleanup activities are unknown, but increased human presence (e.g., vessels) could add to changes in marine mammal behavior and/or distribution, thereby additionally stressing animals and perhaps making them more vulnerable to various physiologic and toxic effects.

Even after an oil spill is stopped, oiling or deaths of marine mammals could still occur due to oil and dispersants persisting in the water, past marine mammal and oil or dispersant interactions, and ingestion of contaminated prey (Lane et al., 2015). The animals' exposure to hydrocarbons persisting in the sea may result in sublethal 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. However, potential sublethal impacts to marine mammals resulting from a potential accidental small spill would be localized to individuals in the vicinity of the spill area and are not expected to jeopardize the continued viability of a marine mammal population.

Cumulative Impacts

The cumulative impact from oil and gas operations includes effects resulting from the CPA proposed action, as well as those resulting from past and future OCS leasing. These impact-producing factors include ingestion and entanglement in marine debris; contaminant spills and spill-response activities; vessel strikes; and noise from numerous sources (i.e., platforms, drillships, helicopters, vessels, etc.), seismic surveys, and explosive severance operations (e.g., decommissioning and structure removal). Potential non-OCS oil- and gas-related factors include vessel traffic and related noise (including from commercial shipping and research vessels), State oil and gas activities, military operations, commercial and recreational fishing, pollution, scientific research, and natural phenomena. The military (U.S. Navy and USCG) and other Federal agencies (USEPA, COE, and NMFS), dredging operations, commercial fishermen, and recreational boaters operate vessels and aircraft that can contribute to the ambient noise in the GOM. Noise in the ocean has become a worldwide topic of concern, particularly in the last two decades. Noises originate from a broad range of sources, both natural and anthropogenic (Richardson et al., 1995). Virtually all of the marine mammal species in the GOM have been exposed to OCS industrial noise due to the rapid advance into GOM deep oceanic waters by the oil and gas industry in recent years; whereas, 20 years ago, the confinement of industry to shallower coastal and continental shelf waters generally only exposed two species of marine mammals (the bottlenose dolphin and the Atlantic spotted dolphin) to industry activities and the related sounds. Most marine mammal species in the GOM, and particularly the deepwater mammals, rely on echolocation for basic and vital life processes including feeding, navigation, and communication. Noise levels that interfere with these basic marine mammal capabilities could have impacts on individuals and populations. The OCS oil and gas industry's operations contribute noise to the marine environment from several different operations. It is believed that some of the industry-related noise is at lower frequencies than is detectable or in the sensitivity range of most of the GOM marine mammal species (Southall et al., 2007). Examples of some industry-related noise sources are summarized in the 2013 G&G Survey Techniques Information sheet (USDOI, BOEM, 2013b) and are described in greater detail in Chapter 3 of the *Atlantic OCS Proposed Geological and Geophysical Activities: Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement* (USDOI, BOEM, 2014c).

Cumulative impacts on marine mammals are expected to result in a number of chronic and sporadic sublethal effects (i.e., behavioral effects and nonfatal exposure to or intake of OCS oil- and gas-related contaminants or discarded debris) that may stress and/or weaken individuals of a local group or population and predispose them to infection from natural or anthropogenic sources (Harvey and Dahlheim, 1994). Disturbance (noise from vessel traffic and drilling operations) and/or exposure to sublethal levels of toxins and anthropogenic contaminants may stress animals, weaken their immune systems, and make them more vulnerable to parasites and diseases that normally would not be fatal (Harvey and Dahlheim, 1994). Cumulative noise can potentially cause masking effects that may prevent an individual from detecting another individual's calls or interfere with navigation ability (Hatch et al., 2014; Merchant et al., 2014; Southall et al., 2007). Available information regarding industry-related and other anthropogenic sound effects on marine mammals are mainly qualitative descriptions, but a committee was convened in 2010 to advance a method for systematic evaluation (Streever et al., 2012). Streever et al. (2012) identified typical anthropogenic sources during autumn bowhead whale migration in the Alaskan Beaufort Sea (i.e., production, seismic data acquisition, and vessel traffic), used available empirical data for bowhead behavior inputs, and conducted a modelled sea trial using simplified assumptions to collect acoustic data for individual virtual animals. Empirical data (i.e., bowhead behavioral response to sound and migration patterns) provided relevant and necessary inputs for the model, ambient noise was not considered, and overall, the committee offered documentation and guidance for future work (Streever et al., 2012). Baseline soundscape is not well-documented for the GOM, and marine mammal behavioral data related to sound effects are not available for all species. BOEM continues to make efforts to gain a more thorough understanding of the potential effects of sound on

marine mammals. The net result of any disturbance will depend upon the size and percentage of the population likely to be affected, the ecological importance of the disturbed area, the environmental and biological parameters that influence an animal's sensitivity to disturbance and stress, or the accommodation time in response to prolonged disturbance (Hatch et al., 2008; Geraci and St. Aubin, 1980).

The effects of the CPA proposed action, when viewed in light of the effects associated with other past, present, and reasonably foreseeable future activities, may result in impacts to marine mammals when compared with before the *Deepwater Horizon* explosion, oil spill, and response; however, the magnitude of those effects cannot yet be determined. This is because the long-term effects may not yet be detectable. A large body of information regarding impacts of the *Deepwater Horizon* explosion, oil spill, and response on marine mammals is being developed through the NRDA process, much of which is covered in the Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). Further, several studies have found overall health problems in some bay, sound, and estuary stocks of bottlenose dolphins where the spill had reached the coast (Venn-Watson et al., 2015; Lane et al., 2015; Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). These studies are discussed further in the "New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS" section below. Nonetheless, as mentioned earlier, operators are required to follow all applicable lease stipulations and regulations, as clarified by NTLs (i.e., NTL 2012-JOINT-G01, NTL 2015-BSEE-G03, and NTL 2012-JOINT-G02), to minimize these potential interactions and impacts. Even when taking into consideration the potential effects of the *Deepwater Horizon* explosion, oil spill, and response and the minimization of impacts through lease stipulations and regulations, no significant cumulative impacts to marine mammal populations would be expected as a result of the proposed activities when added to the impacts of past, present, or reasonably foreseeable oil and gas development in the area, as well as other ongoing activities in the area.

Non-OCS oil- and gas-related activities that may affect marine mammal populations include vessel traffic and related noise (including from commercial shipping and research vessels), State oil and gas activities, military operations, commercial fishing, pollution, scientific research, and natural phenomena. Groups such as the military (U.S. Navy and USCG) and other Federal agencies (USEPA, COE, and NMFS), dredges, commercial fishermen, and recreational boaters operate vessels and aircraft that can contribute to the ambient noise in the GOM. Pollution in the ocean comes from many point and nonpoint sources. The drainage of the Mississippi River results in massive amounts of chemicals and other pollutants being constantly discharged into the GOM. Tropical storms and hurricanes are normal occurrences in the GOM and along the coast. Generally, the impacts have been localized and infrequent. The actual impacts of these storms on the animals in the GOM, and the listed species and critical habitat in particular, have not yet been determined and, for the most part, may remain very difficult to quantify.

An unusual mortality event (UME) is defined under the Marine Mammal Protection Act as "a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response." Infections, biotoxins, human interactions, and malnutrition are considered causes of UMEs. A UME for bottlenose dolphins occurred off the coast of Texas in 2011-2012 when 126 dolphins were stranded. While there is no known cause for the strandings, preliminary findings include infected lungs, poor body condition, discoloration of the teeth, and substance in the stomach in four of the animals (USDOC, NMFS, 2014). Further, a UME for the entire northern GOM began in February 2010 and was declared by NOAA to be "closed" as of May 2016 (USDOC, NMFS, 2016). This UME is discussed further in the "New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS" section below.

More information on the causes of this UME may be found on NMFS's website (USDOC, NMFS, 2016), as research is ongoing, and the relationship of this UME to the *Deepwater Horizon* explosion, oil spill, and response requires more research (refer to the "Incomplete or Unavailable Information" section below).

Within the GOM, there is a long-standing and well-developed OCS Program (more than 50 years); there are no data to suggest that activities from the preexisting OCS Program are significantly impacting marine mammal populations. The incremental contribution of the CPA proposed action to the cumulative impact is expected to be negligible. There are existing leases in the CPA with either ongoing or the potential for oil and gas exploration, drilling, and production activities. In addition, the potential for non-

OCS oil- and gas-related activities discussed herein will continue to occur in the CPA irrespective of the CPA proposed action. The potential for effects from changes to the affected environment (post-*Deepwater Horizon*), routine activities, accidental spills, low-probability catastrophic spills (which are discussed in **Appendix B** and which are not part of the CPA proposed action and not likely expected to occur), and cumulative effects remains whether or not the No Action or an Action alternative is chosen under this Supplemental EIS. Impacts on marine mammals from either smaller accidental events or low-probability catastrophic events would remain the same. Therefore, in light of the CPA proposed action and its impacts, the incremental effect of the CPA proposed action on marine mammal populations is not expected to be significant when compared with the effects associated with other past, present, and reasonably foreseeable future activities, including non-OCS energy-related activities.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS

A search of Internet information sources (NOAA's websites and the RestoreTheGulf.gov website), as well as recently published journal articles, was conducted to determine the availability of recent information on marine mammals.

On December 13, 2010, NMFS declared a UME for cetaceans (whales and dolphins) in the Gulf of Mexico; the UME was later closed in May 2016. Evidence of the UME was first noted by NMFS as early as February 2010, before the *Deepwater Horizon* explosion, oil spill, and response. During this UME, spatial and temporal boundaries of stranded cetaceans were defined as far as the Florida Panhandle and west to the Louisiana-Texas border (USDOC, NMFS, 2015a). However, these boundaries were redefined by NOAA, based upon the analysis of stranding data, to include all cetaceans that stranded in Alabama, Mississippi, and Louisiana from March 2010 through July 2014 and all cetaceans other than bottlenose dolphins that stranded in the Florida Panhandle (Franklin County through Escambia County) from March 2010 through July 2014. The NOAA has claimed that these boundaries could be adjusted in the future based upon the availability of new results or analyses. As of May 2016, a total of 1,141 cetaceans (5% stranded alive and 95% stranded dead) stranded during the UME between Franklin County, Florida, and the Louisiana/Texas border (**Table 4-1**). The UME investigation and the Deepwater Horizon Natural Damage Resource Assessment determined that the *Deepwater Horizon* explosion, oil spill, and response resulted in the death of marine mammals and is the most likely explanation of the persistent, elevated stranding numbers in the northern Gulf of Mexico after the spill. In addition to investigating all other potential causes, scientists are investigating what role *Brucella* plays in the northern Gulf of Mexico UME. As of October 27, 2015, 68 out of 210 dolphins tested were positive or suspected positive for *Brucella*. More details on the UME can be found on NMFS's website (USDOC, NMFS, 2016).

Studies that are published from the NRDA process and that evaluate the possible effects of the *Deepwater Horizon* explosion, oil spill, and response on bottlenose dolphins exposed to oiling have shown overall poor health and prevalence of poor body condition, disease, and abnormalities as compared with bottlenose dolphins in the Gulf of Mexico that were not exposed to oiling (Schwacke et al., 2014, Venn-Watson et al., 2015a). A recent study, which was published on February 11, 2015, indicates that the current multiyear marine mammal UME in the northern Gulf of Mexico has multiple groupings of high bottlenose dolphin mortalities and may be due to different contributing factors, including the *Deepwater Horizon* oil spill (Venn-Watson et al., 2015b). Identification of spatial, temporal, and demographic groupings within the UME suggest that this mortality event may involve different contributing factors varying by location and time, including a potential contributing role of the *Deepwater Horizon* explosion, oil spill, and response, which will be better discerned by incorporating diagnostic information including histopathology and other tissue analysis.

A related study provided information regarding details on histopathology reports from bottlenose dolphins affected by the northern Gulf of Mexico UME (Venn-Watson et al., 2015a). This study confirmed that adrenal disease was prevalent in dolphins that stranded between 2010 and 2012, and it may offer insight to contributing factors for the UME. Results from this study also parsed out a subset of dolphins from Barataria Bay, Louisiana, and showed adrenal atrophy was more prevalent in that isolated cluster. Bacterial pneumonia was identified from dolphins before and during the UME, but it was detected more in the UME dolphins. These results are mentioned further in another study which suggested that the reproduction and survival of the subset of Barataria Bay dolphins was impacted by the

chronic disease and overall poor health (Lane et al., 2015). This study continually monitored female bottlenose dolphins in Barataria Bay that were confirmed to be pregnant via ultrasound during a health assessment conducted in 2011and found decreases in reproductive success and high mortality when compared to a reference group not impacted by the *Deepwater Horizon* explosion, oil spill, and response (Lane et al., 2015).

Continued research will provide a better understanding about the relationship of these UMEs to the *Deepwater Horizon* explosion, oil spill, and response. (refer to the "Incomplete or Unavailable Information" section below).

More detail on the UME can be found on NMFS's website (USDOC, NMFS, 2016). It is still unclear at this time whether the increase in strandings is related wholly to the *Deepwater Horizon* explosion, oil spill, and response mainly due to the fact that other environmental stressors were present and may have contributed to these strandings. A study by Carmichael et al. (2012) suggested that natural stressors combined with the *Deepwater Horizon* explosion, oil spill, and response may have created a "perfect storm" for bottlenose dolphins in the northern Gulf of Mexico. Many coastal species in the northern Gulf of Mexico, including dolphins, experienced unusually harsh winter conditions in early 2010, which were followed by the *Deepwater Horizon* explosion, oil spill, and response. A third potential stressor was introduced in January 2011 when large volumes of cold freshwater, associated with melt water from an unusually large winter snowfall near the Mobile Bay watershed, entered the nearshore coastal systems very rapidly. This event happened days prior to the start of unusually high numbers of perinatal (near term to neonatal) bottlenose dolphin mortalities in the northern Gulf of Mexico from January to April 2011.

The NRDA Trustees' recently published Final PDARP/PEIS identifies a variety of injuries to marine mammals from the *Deepwater Horizon* oil spill, including elevated mortality, reduced reproduction, and disease (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). Many of these findings were previously discussed above (Lane et al., 2015; Schwacke et al., 2014; Venn-Watson et al., 2015a).

While this information may ultimately be useful in expanding the available knowledge on baseline environmental conditions following the *Deepwater Horizon* explosion, oil spill, and response, it remains difficult to draw specific conclusions regarding the current overall bottlenose dolphin population in the GOM.

Incomplete or Unavailable Information

After evaluating the information above, BOEM has determined that the new information does not change the conclusions presented in the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in this Supplemental EIS, as well as in the previously mentioned NEPA documents, BOEM has identified incomplete information for impacts on marine mammals from the *Deepwater Horizon* explosion, oil spill, and response. The *Deepwater Horizon* explosion, oil spill, and response will ultimately allow a better understanding of any realized effects from a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur. However, even with recent publications such as Lane et al. (2015), Schwacke et al. (2014), Venn-Watson et al. (2015a and 2015b), and the Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016), the best available information on impacts to marine mammals does not yet provide a complete understanding of the effects of the oil spill and active response/cleanup activities from the *Deepwater Horizon* explosion, oil spill, and response on marine mammals as a whole in the GOM and whether these impacts reach a population level. As identified above, unavailable information, such as the anthropogenic impacts following an oil-spill response and the population variation due to naturally occurring events such as hurricanes and UMEs, provides challenges in understanding the baseline conditions and changes within marine mammal populations. As also previously discussed, the actual impacts of tropical storms and hurricanes on the GOM, and on the listed species and critical habitat in particular, have not yet been determined and, ultimately, the impacts may remain very difficult to quantify. However, BOEM used existing information and reasonably accepted scientific methodologies to extrapolate from available information in completing this analysis.

BOEM concludes that the unavailable information from these events may be relevant but not essential to determining reasonably foreseeable significant adverse impacts to marine mammals. In some specific cases, such as with bottlenose dolphins as noted above, the unavailable information may also be relevant

to a reasoned choice among the alternatives based on the discussion below. The cost of obtaining data on the effects from the UME and/or *Deepwater Horizon* explosion, oil spill, and response are exorbitant, duplicative of efforts already being undertaken as part of the UME and NRDA, and would likewise take years to acquire and analyze through the existing NRDA and UME processes. The NMFS has jurisdiction for the investigation of marine mammal strandings, and as stated above, some initial findings are just beginning to be published. Therefore, it is not possible for BOEM to obtain this information within the timeline contemplated in the NEPA analysis of this Supplemental EIS, regardless of the cost or resources needed. Wider ranging species may have been exposed to the *Deepwater Horizon* oil spill but are unlikely to have experienced population-level effects due to their wide-ranging distributions and behavior (i.e., Davis et al., 2000; Jochens et al., 2008). Further, impacts from the *Deepwater Horizon* explosion, oil spill, and response may be difficult or impossible to discern from other factors. For example, even 20 years after the *Exxon Valdez* oil spill, long-term impacts to marine mammal populations were still being investigated (Matkin et al., 2008). Therefore, it is not possible for BOEM to obtain this information within the timeline contemplated in the NEPA analysis of this Supplemental EIS, regardless of the cost or resources needed. In light of the incomplete or unavailable information, BOEM's subject-matter experts have used available scientifically credible evidence, such as the scientific research evaluated in the prior 2012-2017 Gulf of Mexico EISs, as well as new information such as the Schwacke et al. (2014) and Venn-Watson et al. (2015a and 2015b) papers, in this analysis and applied it using accepted scientific methods and approaches. Nevertheless, a complete understanding of the missing information is not essential to a reasoned choice among alternatives for this Supplemental EIS (including the No Action and Action alternatives) for the three main reasons listed below.

(1) The CPA is an active oil and gas region with ongoing (or the potential for) exploration, drilling, and production activities. In addition, non-OCS oil- and gas-related activities will continue to occur in the CPA irrespective of the CPA proposed action (i.e., fishing, military activities, and scientific research). The potential for effects from changes to the affected environment (post-*Deepwater Horizon*), routine activities, accidental spills (including low-probability catastrophic spills), and cumulative effects remains whether or not the No Action or an Action alternative is chosen under this Supplemental EIS.

(2) Some marine mammal populations in the CPA do not generally travel throughout areas affected by spilled oil from the *Deepwater Horizon* explosion, and they would not be subject to a changed baseline or cumulative effects from the *Deepwater Horizon* explosion, oil spill, and response (e.g., coastal bottlenose dolphins that are resident in the EPA). Other marine mammals, such as Bryde's whales and manatees, although potentially affected by the *Deepwater Horizon* explosion, oil spill, and response, also do not typically occur in the proposed CPA lease sale area.

(3) Other wide-ranging populations of marine mammals (e.g., sperm whales) that may occur in the CPA and within areas affected by the spill are unlikely to have experienced population-level effects from the *Deepwater Horizon* explosion, oil spill, and response given their wide-ranging distribution and behaviors.

Summary and Conclusion

BOEM has reexamined the analysis for marine mammals presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. The information discovered does not alter the impact conclusion for marine mammals presented in those NEPA documents. The analysis and potential impacts detailed and updated in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.13. Sea Turtles

BOEM has reexamined the analysis for sea turtles presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for sea turtles in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the routine events, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.13 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.13 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.13 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

In order to minimize potential interactions and impacts to sea turtles, operators are required to follow all applicable lease stipulations and regulations, as clarified by NTLs. The operator's reaffirmed compliance with NTL 2012-JOINT-G01 ("Vessel-Strike Avoidance and Injured/Dead Protected Species Reporting") and NTL 2015-BSEE-G03 ("Marine Trash and Debris Awareness Elimination"), as well as the limited scope, timing, and geographic location of the CPA proposed action, would result in negligible effects from the CPA proposed action on sea turtles. In addition, NTL 2012-JOINT-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program," minimizes the potential of harm from seismic operations to sea turtles and marine mammals; these mitigations include onboard observers, airgun shut-downs for whales in the exclusion zone, ramp-up procedures, the use of a minimum sound source, and delayed use of explosives when sea turtles or marine mammals are observed in the exclusion zone.

Impacts of Routine Activities and Accidental Events

The routine activities associated with proposed CPA Lease Sale 247 that could potentially affect sea turtles include the following: the degradation of water quality resulting from operational discharges; noise generated by helicopter and vessel traffic, platforms, drill ships, and seismic exploration; noise and impact from explosive structure removals; vessel strikes; and marine debris generated by service vessels and OCS oil- and gas-related facilities. Noise disturbance and/or exposure to sublethal levels of toxins and anthropogenic contaminants may stress animals, weaken their immune systems, and make them more vulnerable to parasites and diseases that normally would not be fatal during their life cycle. Because of the mitigations (e.g., BOEM and BSEE proposed compliance with NTLs) as described in the prior 2012-2017 Gulf of Mexico EISs and as summarized below, routine activities (e.g., operational discharges, noise, vessel traffic, and marine debris) related to the CPA proposed action are not expected to have long-term adverse effects on the size and productivity of any sea turtle species or populations in the northern Gulf of Mexico. With the mitigations, few deaths are expected from chance collisions with OCS oil- and gas-related service vessels, ingestion of plastic material, and pathogens. To minimize impacts to sea turtles and marine mammals from explosive structure removal, the use of explosives is delayed when sea turtles or marine mammals are observed in the exclusion zone. In addition, the best available scientific information indicates that sea turtles do not rely on acoustics; therefore, vessel noise and related activities (drilling, seismic exploration, and explosive structure removals) would have limited effects. Most routine OCS oil- and gas-related activities are expected to have sublethal effects that are not expected to rise to the level of significance.

Accidental events including marine debris generated by service vessels and OCS oil- and gas-related facilities, oil spills, contaminant spills, and spill-response activities may be associated with the CPA proposed action. The major impact-producing factors resulting from the accidental activities associated with the CPA proposed action that may affect loggerhead, Kemp's ridley, hawksbill, green, and leatherback turtles include accidental oil spills, and spill-response activities that have the potential to impact small to large numbers of sea turtles in the GOM, depending on the magnitude and frequency of accidents, the ability to respond to accidents, the location and time of year the accidents occur, and various meteorological and hydrological factors. Impacts from smaller accidental events may affect individual sea turtles in the area, but impacts are unlikely to rise to the level of population effects (or significance) given the size and scope of such spills. Population-level impacts are not anticipated based on the best available information. Further, the potential remains for smaller accidental spills to occur in the CPA proposed action area, regardless of any alternative selected under this Supplemental EIS, given that it is an active oil and gas region with either ongoing or the potential for exploration, drilling, and production activities.

Cumulative Impacts

The cumulative analysis considers the effects of impact-producing factors of OCS oil- and gas-related impacts along with non-OCS oil- and gas-related impacts of other commercial, military, recreational, offshore, and coastal activities that may occur and adversely affect sea turtles in the same general area of the CPA proposed action. The major impact-producing factors resulting from cumulative OCS oil- and gas-related activities associated with the CPA proposed action that may affect loggerhead, Kemp's ridley, hawksbill, green, and leatherback turtles and their habitats include marine debris, contaminant spills and spill-response activities, vessel strikes, noise, seismic surveys, and explosive structure removals. Lease stipulations and regulations, as clarified by NTLs, are in place to reduce vessel strike mortalities, impacts from marine trash and debris, and seismic surveys. The cumulative impact of these ongoing OCS oil- and gas-related activities on sea turtles may result in a number of chronic and sporadic sublethal effects (i.e., behavioral effects and nonfatal exposure to or intake of OCS oil- and gas-related contaminants or discarded debris) because these activities may stress and/or weaken individuals of a local group or population and may predispose them to infection from natural or anthropogenic sources. However, these effects are not expected to impact the GOM sea turtle population as a whole. As discussed in **Appendix B**, a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, could have population-level effects on sea turtles. The net result of any disturbance depends upon the size and percentage of the population likely to be affected, the ecological importance of the disturbed area, the environmental and biological parameters that influence an animal's sensitivity to disturbance and stress, or the accommodation time in response to prolonged disturbance (Geraci and St. Aubin, 1980).

Non-OCS oil- and gas-related activities that may affect sea turtle populations include vessel noise and strikes (including commercial shipping, recreational, and research vessels), State drilling operations, military operations, commercial and recreational fishing, pollution, historic overexploitation, coastal infrastructure and habitat loss, dredging, pathogens, increased runoff, and natural phenomena. Effects from these activities could result in physiological stress, reduced reproductive success, weakened immune systems, or mortality of individuals.

The effects of the CPA proposed action, when viewed in light of the effects associated with other past, present, and reasonably foreseeable future activities, may result in more significant impacts to sea turtles as compared with effects before the *Deepwater Horizon* explosion, oil spill, and response; however, the magnitude of those effects cannot yet be determined. Applicable lease stipulations and regulations, as clarified by NTLs such as those discussed above, would minimize impacts. Even when taking into consideration the potential effects of the *Deepwater Horizon* explosion, oil spill, and response and the minimization of impacts through lease stipulations and regulations, no significant cumulative impacts to sea turtles would be expected as a result of the proposed exploration activities when added to the impacts of past, present, or reasonably foreseeable oil and gas development in the area, as well as other ongoing activities in the area.

No significant cumulative impacts to sea turtles would be expected as a result of the CPA proposed action. The potential for impacts is mainly focused on the individual, and population-level impacts are not anticipated. The effects of the CPA proposed action, when viewed in light of the effects associated with other past, present, and reasonably foreseeable future OCS oil- and gas-related activities, may result in greater impacts to sea turtles than before the *Deepwater Horizon* explosion, oil spill, and response; however, the magnitude of those effects cannot yet be determined. However, the incremental contribution of the CPA proposed action would not be likely to result in a significant incremental impact on sea turtles within the CPA; in comparison, non-OCS oil- and gas-related activities, such as overexploitation, commercial fishing, and pollution, have historically proved to be a greater threat to sea turtles.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS

A search was conducted for information published on sea turtles, and various Internet sources were examined to determine any recent information regarding sea turtles. Sources investigated included, but were not limited to, journals and scientific articles, Google, Google Scholar, and other Federal and State

natural resource management agency websites. All new relevant information was incorporated into the analysis below.

On April 21, 2015, NMFS published a final rule, "Fisheries of the Northeastern United States; Atlantic Sea Scallop Fishery and Northeast Multispecies Fishery; Framework Adjustment 26; Endangered and Threatened Wildlife; Sea Turtle Conservation," which modified existing regulations on fishing gear alignment measures to protect sea turtles (*Federal Register*, 2015d). On April 6, 2016, NMFS published a final rule for "Endangered and Threatened Species; Identification and Proposed Listing of Eleven Distinct Population Segments (DPS) of Green Sea Turtles (*Chelonia mydas*) as Endangered or Threatened and Revision of Current Listings," which identified the North Atlantic DPS, the green sea turtles associated with the Gulf of Mexico and U.S. Atlantic as threatened (*Federal Register*, 2016c). Lamont et al. (2015) published a report on the importance of the Gulf of Mexico for different life stages of the GOM loggerhead distinct population segment. The authors suggested that the loss of individual habitats could have long-term consequences to population recovery by affecting several life stages (Lamont et al., 2015). Putman and Mansfield (2015) reported that the once thought passive-drifting juveniles (*Sargassum*-associated stage) are actually active swimmers. Their research used synchronized surface drifter and tagged turtle releases to support the hypothesis that sea turtles in the Gulf of Mexico are able to move themselves and are not dispersed solely by currents (Putnam and Mansfield, 2015).

Within the GOM, there is a long-standing and well-developed OCS Program (more than 50 years); there are no data to suggest that activities from the preexisting OCS Program are significantly impacting sea turtle populations within these designated critical habitats. Therefore, in light of the CPA proposed action and its impacts, the incremental effect on sea turtle critical habitat is not expected to be significant when compared with non-OCS energy-related activities.

Since January 1, 2011, a notable increase in sea turtle strandings has occurred in the northern GOM. While turtle strandings in this region typically increase in the spring, the increase is a cause for concern. The Sea Turtle Stranding and Salvage Network is monitoring and investigating this increase. The network is part of the NOAA/FWS National Marine Mammal Health and Stranding Response Program and encompasses the coastal areas of the 18 states from Maine through Texas. There are many possible reasons for the increase in strandings in the northern GOM, both natural and human caused (USDOC, NMFS, 2015b). These sea turtle species include loggerhead, green, Kemp's ridley, leatherback, hawksbill, and unidentified. The most recent update to these stranding data on NMFS's website was on August 25, 2013 (USDOC, NMFS, 2013), without conclusive findings about the strandings.

The NRDA Trustees' recently published Final PDARP/PEIS identifies negative impacts to four species of federally endangered or threatened sea turtles (i.e., Kemps' ridley, green, loggerheads, and hawksbill) related to oil exposure and oil-spill response activities (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Trustees estimated that exposure to oil resulted in deaths of small juvenile turtles living offshore and larger sub-adult and adult turtles in shallower waters closer to shore, and that numerous sea turtle hatchlings were displaced from the Gulf of Mexico by *Deepwater Horizon* oil-spill response activities (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

The new information presented in this chapter provides additional details on the baseline affected environment for sea turtles, and it does not change BOEM's conclusions about the potential effects of the CPA proposed action on sea turtles.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions from the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, and CPA 235/241/247 Supplemental EIS; nevertheless, there is still incomplete or unavailable information. As discussed above, as well as in the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, and CPA 235/241/247 Supplemental EIS, BOEM has identified incomplete information regarding impacts of the *Deepwater Horizon* explosion, oil spill, and response on sea turtles in the CPA. BOEM used existing information and reasonably accepted scientific methodologies to extrapolate from available information in completing the relevant analysis of potential oil exposure impacts to sea turtles using studies investigating evidence of oil and impacts stemming from exposure to oil (Witham, 1978; Vargo et al., 1986; Lutz and Lutcavage, 1989; Lutcavage et al., 1995; Plotkin and Amos, 1988). In addition, BOEM used information published on sea turtle nesting to draw

conclusions about sea turtle populations following the *Deepwater Horizon* explosion, oil spill, and response (USDOC, NMFS, 2015b; State of Florida, Fish and Wildlife Conservation Commission, 2014a and 2014b; Share the Beach, 2015). Unavailable information on the effects to sea turtles from the *Deepwater Horizon* explosion, oil spill, and response (and thus changes to the sea turtle baseline in the affected environment) makes an understanding of the cumulative effects less clear. The NRDA Trustees recently published the Final PDARP/PEIS; information from the Trustees' damage assessment is included above. Relevant data on the status of sea turtle populations after the *Deepwater Horizon* explosion, oil spill, and response and increased sea turtle GOM strandings may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion, oil spill, and response may be difficult or impossible to discern from other factors. BOEM used existing information and reasonably accepted scientific methodologies to extrapolate from available information on sea turtle nests and strandings in completing the relevant analysis of sea turtle populations. None of these sources reveal reasonably foreseeable significant adverse impacts. Therefore, BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to sea turtles because the full extent of impacts on sea turtles is not known, but BOEM has determined that the information is not essential to a reasoned choice among alternatives for this Supplemental EIS.

Nevertheless, there are existing leases in the CPA with either ongoing or the potential for exploration, drilling, and production activities. In addition, non-OCS oil- and gas-related activities will continue to occur in the CPA irrespective of the CPA proposed action (i.e., fishing, military activities, and scientific research). The potential for effects from changes to the affected environment (post-*Deepwater Horizon* explosion, oil spill, and response), routine activities, accidental spills (including low-probability catastrophic spills), and cumulative effects remains whether or not the No Action or an Action alternative is chosen under this Supplemental EIS. All wide-ranging populations of sea turtles that may occur in the CPA and within areas affected by the spill are unlikely to have experienced population-level effects from the *Deepwater Horizon* explosion, oil spill, and response given their wide-ranging distribution and behaviors.

Summary and Conclusion

BOEM has reexamined the analysis for sea turtles presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for sea turtles presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.14. Diamondback Terrapins

BOEM has reexamined the analysis for the Texas diamondback terrapin (*Malaclemys terrapin littoralis*) and Mississippi diamondback terrapin (*Malaclemys terrapin pileata*) (referred to as diamondback terrapins in this Supplemental EIS) presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for diamondback terrapins in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action is presented in Chapter 4.2.1.14 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.14 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.14 of the CPA 235/241/247 Supplemental EIS and CPA 241/241 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from the prior 2012-2017 Gulf of Mexico EISs. BOEM has found no significant new information that has become available since those NEPA documents were published.

The national and subnational conservation status rank of diamondback terrapins is "vulnerable" or at a moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors. "Species of concern" is an informal term that refers to those species that might be in need of concentrated conservation actions.

Such conservation actions vary depending on the health of the populations and the degree and types of threats. At one extreme, there may only need to be periodic monitoring of populations and threats to the species and its habitat. At the other extreme, a species may need to be listed as a federally threatened or endangered species under the Endangered Species Act. Species of concern receive no legal protection above those already afforded the species under other laws, and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species. At the present time, the diamondback terrapin is neither a listed species nor a candidate for listing under the Endangered Species Act.

Impacts of Routine Activities and Accidental Events

The following routine activities associated with proposed CPA Lease Sale 247 could potentially affect diamondback terrapins: ingestion of beach trash and debris generated by service vessels and OCS oil- and gas-related facilities; direct injury from vessel traffic (boat propellers); and indirect injury from loss of habitat due to coastal marsh erosion associated with vessel traffic (refer to **Chapters 4.1.1.3 and 3.3.4.3** of this Supplemental EIS and Chapters 4.1.1.3 and 3.3.4.3 of the CPA 241/247 and EPA 226 Supplemental EIS). Erosion to marshes can be indirectly attributed to OCS service traffic and onshore development, but it is expected to cause little to no damage to the physical integrity, species diversity, or biological productivity of terrapin habitat. Adverse impacts due to routine activities resulting from the CPA proposed action are possible but unlikely. Annual awareness training, as required by NTL 2012-BSEE-G01 ("Marine Trash and Debris Awareness and Elimination"), is expected to reduce the amount of marine debris from OCS oil- and gas-related activities and to minimize the effects on marine life. Due to the distance from shore, most impacts are not expected to reach terrapins or their habitat. Impacts that may occur from routine activities of the CPA proposed action are unlikely to have significant adverse effects on the size and recovery of any terrapin subspecies or population in the Gulf of Mexico because most routine, OCS oil- and gas-related activities are expected to have sublethal effects. Sublethal effects such as behavioral effects, nonfatal exposure to or intake of OCS oil- and gas-related contaminants, or discarded debris may stress and/or weaken individuals of a local group or population and predispose them to infection from natural or anthropogenic sources. These effects are not expected to rise to the level of significance to affect the populations.

Impact-producing factors associated with accidental events that may be associated with the CPA proposed action that could affect diamondback terrapins include offshore and coastal oil spills and spill-response activities. Even after oil is no longer visible, terrapins may still be exposed while they forage in the salt marshes lining the edges of estuaries where oil may have accumulated under the sediments and within the food chain (Burger, 1994; Roosenburg et al., 1999). In 2010, contaminants associated with petroleum products were detected in low concentrations using blood plasma samples from terrapins along the Gulf Coast, but it was not conclusive in determining the source of the hydrocarbon compounds (Drabek et al., 2014). Cleanup efforts may affect reproductive success if nests are disturbed or destroyed. Hatching success studies at various oiled nesting sites of the northern diamondback terrapin suggest that spills may result in a reduction in nest size and increased mortality of spring emergers at the oiled sites (Wood and Hales, 2001). However, research on the PAH exposure and toxicology of eggs in the vicinity of a spill site found no correlation to substrate PAHs when compared with egg toxicology. The level of PAHs found in the eggs may be the result of maternal transfer and represent the exposure level of the nesting female rather than environmental exposure to PAHs from oil at the site of the nest (Holliday et al., 2008). Impacts on diamondback terrapins from smaller accidental events are likely to affect individual diamondback terrapins in the spill area, but they are unlikely to rise to the level of population effects (or a level of significance) given the probable size and scope of such spills. Further, the potential remains for smaller accidental spills to occur in the CPA proposed action area, regardless of any alternative selected under this Supplemental EIS, given that it is an active oil and gas region with either ongoing or the potential for exploration, drilling, and production activities.

Cumulative Impacts

The major OCS oil- and gas-related impact-producing factors that may affect the diamondback terrapin include (1) vessel traffic, (2) exposure or intake of OCS oil- and gas-related contaminants or debris, and (3) oil spills and spill response. To mitigate the potential impacts from OCS oil- and gas-

related activities, operators are required to follow all applicable lease stipulations and regulations, as clarified by NTLs, to minimize these potential interactions and impacts. The operator's reaffirmed compliance with NTL 2012-BSEE-G01 ("Marine Trash and Debris Awareness and Elimination"), as well as the limited scope, timing, and geographic location of the CPA proposed action, would result in minimal effects from the proposed drilling activities on diamondback terrapins. Most spills related to the CPA proposed action, as well as low-probability catastrophic spills, which are not part of the CPA proposed action and not likely expected to occur (refer to **Appendix B** for more information), as well as oil spills stemming from tankering and prior and future lease sales, are not expected to contact terrapins or their habitats. Most routine and accidental OCS oil- and gas-related activities are expected to have sublethal effects, such as behavioral effects, that are not expected to rise to the level of significance to the populations as a whole. Therefore, the incremental contribution of the CPA proposed action to cumulative impacts on terrapins is expected to be minimal.

Activities posing the greatest potential harm to terrapins are non-OCS oil- and gas-related factors, including habitat destruction, overharvesting and crab pot fishing, vessel traffic and road mortality, nest depredation, State oil- and gas-related activity, and natural processes. Spending most of their lives within their limited home ranges at the aquatic-terrestrial boundary in estuaries, terrapins are susceptible to habitat destruction (i.e., urban development, subsidence/sea-level rise, direct oil contact from non-OCS oil- and gas-related leasing program activities, and associated cleanup efforts). Habitat destruction, road construction, nest depredation, and drowning in crab traps are the most recent threats to diamondback terrapins. In the 1800's, populations declined due to overharvesting for meat (Hogan, 2003). Tropical storms, hurricanes, and beach erosion threaten their preferred nesting habitats. Characteristics of terrapin life history render this species especially vulnerable to overharvesting and habitat loss. These characteristics include low reproductive rates, low survivorship, limited population movements, and nest site fidelity year after year. Inshore oil spills from non-OCS oil- and gas-related sources are potential threats to the terrapins' brackish coastal marsh habitat.

The incremental contribution of the CPA proposed action is expected to be minimal compared with non-OCS oil- and gas-related activities. The major impact-producing factors resulting from the cumulative activities associated with the CPA proposed action that may affect diamondback terrapins include oil spills and spill-response activities, alteration and reduction of habitat, and consumption of trash and debris. Overall, within the CPA, there is a long-standing and well-developed OCS Program (more than 50 years); there are no data to suggest that activities from the preexisting OCS Program are significantly impacting diamondback terrapin populations. Due to the extended distance from shore, impacts associated with activities occurring in the OCS Program are not expected to impact terrapins or their habitat. Non-OCS oil- and gas-related activities will continue to occur in the CPA irrespective of the proposed CPA lease sale (i.e., crabbing, fishing, military activities, scientific research, and shoreline development). Therefore, in light of the above analysis of the CPA proposed action and its impacts, the incremental effect of the CPA proposed action on diamondback terrapin populations is not expected to be significant when compared with historic and current non-OCS oil- and gas-related activities, such as habitat loss, overharvesting, crabbing, and fishing.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search of Internet information sources (NOAA's and FWS's websites, and the RestoreTheGulf.gov website), as well as recently published journal articles, was conducted to determine the availability of recent information on diamondback terrapins. The search revealed no new significant information was found at this time that would alter the overall conclusions of the prior 2012-2017 Gulf of Mexico EISs that impacts on diamondback terrapins associated with the CPA proposed action are expected to be minimal.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the conclusions from previous documents are still valid because no new information on diamondback terrapins pertinent to the proposed action has become available since publication of the prior 2012-2017 Gulf of Mexico EISs;

nevertheless, there is still incomplete or unavailable information, including population status, on possible impacts to diamondback terrapins as a result of the *Deepwater Horizon* explosion, oil spill, and response.

Diamondback terrapins within the CPA were not likely affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and response, based on the best available information and the distance of terrapin habitat from the *Macondo* well. However, BOEM has identified incomplete information regarding impacts of the *Deepwater Horizon* explosion, oil spill, and response on diamondback terrapin in the CPA because little information about *Deepwater Horizon* explosion, oil spill, and response has been released as of the publication of this Supplemental EIS. Through the NRDA process, ongoing research and analysis of the presence of contaminants in terrapin eggs following the *Deepwater Horizon* oil spill is being conducted (USDOC, NOAA, 2012), but the results are not yet available. Relevant data on the status of diamondback terrapin populations after the *Deepwater Horizon* explosion, oil spill, and response may take years to acquire and analyze, and impacts may be difficult or impossible to discern from other factors. This incomplete information may be relevant to evaluating adverse effects because the full extent of potential impacts on terrapins is not known. In place of the missing information, BOEM used existing information and reasonably accepted scientific methodologies to extrapolate from available information in completing the relevant analysis, such as studies investigating the evidence of oil and impacts stemming from exposure to oil (Burger, 1994; Roosenburg et al., 1999; Holliday et al., 2008; Wood and Hales, 2001; Drabek et al., 2014). The results of these studies indicate impacts resulting from the *Deepwater Horizon* oil spill have been largely indistinguishable from natural fluctuations or variability due to other anthropogenic activities. Although the body of available information is incomplete and long-term effects cannot yet be known, past analyses are not indicative of significant population-level responses. BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for diamondback terrapins presented in the prior 2012-2017 Gulf of Mexico EISs. No new significant information was discovered that would alter the impact conclusion for diamondback terrapin presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for the proposed CPA Lease Sale 247.

4.1.1.15. Beach Mice

BOEM has reexamined the analysis for beach mice presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the conclusion for beach mice presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.15 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.15 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.15 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impact of Routine Activities and Accidental Events

The potential routine impact-producing factors that may affect beach mice are beach trash and debris, and efforts undertaken for the removal of marine debris or for restoration. An impact from the routine activities associated with the CPA proposed action on the Alabama (*Peromyscus polionotus ammobates*), Choctawhatchee (*P. p. allophrys*), St. Andrew (*P. p. peninularis*), and Perdido Key (*P. p. trissyllepsis*) beach mice is possible but unlikely. Impacts may result from consumption of or entanglement in beach trash and debris. Because the CPA proposed action would deposit only a small portion of the total debris that would reach the habitat, the impacts would be minimal. Any coastal discharges into marine water

would not affect beach mice because they drink only fresh water. Boat traffic would have no impact on beach mice because they live above high tide. Helicopter traffic is expected to occur only well to the west of beach mouse habitat (the nearest existing helicopter hub is in Theodore, Alabama; refer to Chapter 3.1.2.1.2. of the 2012-2017 WPA/CPA Multisale EIS). Coastal and nearshore construction projects (e.g., those producing OCS oil- and gas-related supporting structures and facilities and those involving OCS oil- and gas-related activities such as navigation channel dredging) are not expected to have impacts on beach mice because their critical habitat is protected.

The major impact-producing factors resulting from accidental events associated with the CPA proposed action that may affect beach mice include offshore and coastal oil spills, and spill-response activities. The oiling of beach mice could result in local extinction. An accidental spill occurring and contacting the shoreline is unlikely and the area of viable habitat is broad relative to the area potentially contacted by a spill (Figure 3-11 of the 2012-2017 WPA/CPA Multisale EIS). To contact beach mouse habitat oil would have to wash over the foredunes to beach mouse habitat in a storm surge. Disruption of beach mouse habitat could occur from oil-spill cleanup by trampling or vehicle traffic if personnel are not properly trained or supervised. A review of the available information shows that impacts on beach mice from accidental impacts associated with the CPA proposed action would be minimal.

Cumulative Impacts

Cumulative activities have the potential to harm or reduce the abundance of beach mice. Cumulative impacts could potentially deplete some beach mice populations to unsustainable levels. However, the expected incremental contribution of the CPA proposed action to these cumulative impacts is negligible. The OCS oil- and gas-related impacts include oil spills and cleanup operations, the consumption of and entanglement in beach trash and debris, and trash and debris removal efforts. Most spills related to the CPA proposed action and prior and future lease sales are not expected to contact beach mice or their habitats because the species lives above the intertidal zone where contact is less likely. Destruction of the remaining beach mouse habitat due to a low-probability catastrophic spill and cleanup activities, which is not part of the CPA proposed action and not likely expected to occur, would increase the threat of extinction. Impacts on beach mice from a catastrophic spill are discussed in **Appendix B**.

Non-OCS oil- and gas-related impacts include oil spills **f**rom State oil and gas activities and import tankers; beach development that alters, fragments, or reduces habitat; hurricanes; and tropical storms. Within the last 20-30 years, the combination of habitat loss due to beachfront development, the isolation of remaining beach mouse habitat areas and populations, and the destruction of the remaining habitat by tropical storms and hurricanes have increased the threat of extinction of several subspecies of beach mice. In comparison to the cumulative OCS and non-OCS impacts, the expected incremental contribution of the CPA proposed action to the cumulative impacts on beach mice is negligible.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search of Internet information sources including published journal articles was conducted to determine the availability of recent information on beach mice. Websites visited included Federal agencies (U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, U.S. Geological Survey, and the Bureau of Ocean Energy Management) and various stakeholders (Sierra Club, National Fish and Wildlife Foundation, Nature Conservancy, Gulf Coast Ecosystem Restoration Council, and NOAA Central Library's *Deepwater Horizon* Bibliography [Belter, 2014]). Where applicable, websites of subdivisions of many of these organizations were also consulted. Environmental journal articles were also located online using four search engines (JSTOR, EBSCO, Google Advanced Scholar Search, and Google Advanced Book Search). Three of the search engines collectively searched all of the ecology journals of six major publishers (John Wiley and Sons, Springer, Elsevier Science, Taylor and Francis Group, Cambridge University Press, and Oxford University Press).

This search resulted in information about the Perdido Key beach mouse. Its population may be at a record high since its time of Federal listing as an endangered or threatened species on June 6, 1985 (USDOI, FWS, 2014). Its requirements for corridor size and tolerance to fragmentation are unknown

(USDOI, FWS, 2014); however, this new information indicates important baseline conditions about the population of this resource.

In addition, the NRDA Trustees' recently published Final PDARP/PEIS states that shoreline resources were injured along the coastline of the northern Gulf of Mexico due to the *Deepwater Horizon* oil spill (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Final PDARP/PEIS also identified that direct mortality as well as behavior modification of nocturnal animals, such as beach mice, had occurred due to oil-spill response activities.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in this Supplemental EIS and in the prior 2012-2017 Gulf of Mexico EISs, BOEM has identified incomplete information regarding beach mice in the CPA. This incomplete information may be relevant to an evaluation of adverse effects because it provides any change in the baseline environmental conditions for beach mouse populations in the affected environment from the *Deepwater Horizon* oil spill and response, exacerbating any impacts from the CPA proposed action. The NRDA Trustees' recently published Final PDARP/PEIS provides some preliminary information about *Deepwater Horizon* impacts to beach mice (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). Relevant data on the status of beach mice after the *Deepwater Horizon* explosion, oil spill, and response may take years to acquire and analyze. Much of these data are being developed through the NRDA process, which may take years to complete. It is not possible for BOEM to obtain this information and incorporate it into this analysis within the timeline contemplated in the NEPA analysis of this Supplemental EIS, regardless of the costs or resources needed. Current studies are investigating the effects of the *Deepwater Horizon* explosion, oil spill, and response activities on beach mice and their habitat (Frater, official communication, 2014). The time when the studies' results will be released is unclear; therefore, BOEM cannot commit to waiting for this new information to become available to incorporate it into this Supplemental EIS.

BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. The following is an example of extrapolations made from data summarized from OSAT-2 (2011) that BOEM used in the stead of unavailable and incomplete information. Assessment of the efficacy of shoreline cleanup in supratidal Alabama beach mouse habitat showed 60 percent "no oil observed," 37 percent "light-very light oiling," and 3 percent "moderate-heavy oiling." Much of the supratidal habitat of the Perdido Key and Choctawhatchee beach mice showed "no oil observed." Impacts on Perdido Key beach mouse habitat from the *Deepwater Horizon* explosion, oil spill, and response may not have occurred based on both the OSAT-2 approach and a newer approach that measured its population at a record high since its time of Federal listing as an endangered or threatened species on June 6, 1985 (USDOI, FWS, 2014). The supratidal habitat of the St. Andrew beach mouse was not affected by the *Deepwater Horizon* oil spill and response. A "toxicity reference value" is developed by USEPA for low (2-3 ring) and high (4-7 ring) molecular weight PAHs. Two scenarios for the PAH oral uptake by the Alabama beach mouse were reported: 10 percent contribution and a worst-case 100 percent contribution of small tarballs to the overall ingesting of soil. The estimated daily dose of PAHs from oral uptake following the *Deepwater Horizon* oil spill and response did not exceed the toxicity reference value for low molecular weight PAHs in the Alabama beach mouse.

The following is another example of extrapolations made from data summarized from Frater (official communication, 2011) that BOEM used in the stead of unavailable or incomplete information. Known occupied beach mouse habitat has been trampled, denuded, and eroded. Reasonable estimates of the amount of beach mouse habitat that has been damaged, altered, or destroyed varies from 1 to 50 ac (0.4 to 20 ha) throughout the range of the five Gulf Coast subspecies (4 of which are federally protected). Preliminary data suggest that impacts to beach mouse habitat was very minor. The impacts to beach mouse habitat during the *Deepwater Horizon* response probably have not caused significant impacts to the population levels of beach mice. Impacts on Perdido Key beach mouse habitat from the *Deepwater Horizon* explosion, oil spill, and response may not have occurred based on a measure of its population at a record high since its time of Federal listing as an endangered or threatened species on June 6, 1985 (USDOI, FWS, 2014). The habitat that was damaged was primarily young dunes. The damage may

restrict population expansion and recovery for a few years, but anticipated restoration activities will probably offset this impact in the near future.

Any additional NRDA information obtained from the *Deepwater Horizon* oil spill and response is unlikely to be so significant as to change the assessed impact level. In summary, BOEM has determined that the information is not essential to a reasoned choice of alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for beach mice presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. The information discovered does not alter the impact conclusion for beach mice presented in those NEPA documents. The analysis and potential impacts detailed and updated in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.16. Coastal and Marine Birds

BOEM has reexamined the analysis for coastal and marine birds presented in the prior 2012-2017 Gulf of Mexico EISs based on additional information presented below. No new significant information was discovered that would alter the impact conclusion for coastal and marine birds presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.16 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.16 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.16 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The majority of the effects resulting from routine activities of the CPA proposed action (**Tables 3-2 through 3-4**) on threatened or endangered (Table 4-1 of the WPA 233/CPA 231 Supplemental EIS) and nonthreatened and nonendangered coastal and marine birds are expected to be sublethal, primarily disturbance-related effects (Chapter 4.2.1.16.2 of the 2012-2017 WPA/CPA Multisale EIS and Chapter 4.2.1.16 of the WPA 233/CPA 231 Supplemental EIS). Major potential impact-producing factors resulting from routine activities for marine birds in the offshore environment include the following:

- habitat loss and fragmentation (Fahrig, 1997 and 1998);
- behavioral effects primarily due to disturbance from OCS oil- and gas-related helicopter and service-vessel traffic and associated noise (Habib et al., 2007; Bayne et al., 2008);
- mortality due to exposure and intake of OCS oil- and gas-related contaminants, e.g., drilling discharges and produced waters (Wiese et al., 2001; Fraser et al., 2006) and discarded debris (Robards et al., 1995; Pierce et al., 2004);
- sublethal, chronic effects from air emissions (Newman, 1979; Newman and Schreiber, 1988); and
- mortality and energetic costs associated with structure presence and associated light (Russell, 2005; Montevecchi, 2006).

Overall, impacts to avian species from routine activities are expected to be adverse but not significant. Impacts from routine activities are more likely to be sublethal to moderate numbers of birds and infrequently lethal. Mortality is expected to be distributed among many populations with no substantial mortality for any one population.

Impact-producing factors from accidents include oil spills, regardless of size and despite oil-spill cleanup activities, including the release of rehabilitated birds. Information regarding the CPA proposed action and oil-spill information can be found in Table 3-22 of the 2012-2017 WPA/CPA Multisale EIS. Oil spills (and disturbance impacts associated with cleanup activities) have the greatest impact on coastal and marine birds. Sometimes the rehabilitation of birds may have benefits beyond wild bird condition because of veterinary care that wild birds do not receive. However, the handling of birds during rehabilitation may sometimes stress birds. Depending on the timing and location of the spill, even small spills can result in major avian mortality events (Piatt et al., 1990a and 1990b; Castège et al., 2007; Wilhelm et al., 2007). Small amounts of oil can affect birds, and mortality from oil spills is often related to numerous symptoms of toxicity (Burger and Gochfeld, 2001; Albers, 2006). Data from actual spills strongly suggest that impacts to a bird species' food supply are typically delayed after initial impacts from direct oiling (e.g., Esler et al., 2002; Velando et al., 2005; Zabala et al., 2010). Sublethal, long-term effects of oil on birds have previously been documented (Esler et al., 2000; Alonso-Alvarez et al., 2007), including changes to sexual signaling (Pérez et al., 2010).

Oil-spill impacts on birds from the CPA proposed action are expected to be adverse but not significant, given the number and relatively small size of spills expected over the 40-year life of the CPA proposed action (Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS). Impacts of oil-spill cleanup from the CPA proposed action are also expected to be adverse, but not significant, and may be negligible depending on the scope and scale of efforts. Significant impacts to coastal and marine birds could result in the event of a low-probability catastrophic spill, depending on the timing, location, and size of the spill. However, this is not part of the CPA proposed action and is not likely expected to occur. For additional information on a low-probability catastrophic spill, refer to **Appendix B**.

Cumulative Impacts

The cumulative analysis considers impact-producing factors that may adversely affect populations of threatened and endangered avian species, as well as nonthreatened and nonendangered species, related to OCS oil- and gas-related and non-OCS oil- and gas-related activities. Several OCS oil- and gas-related impact-producing factors could potentially affect coastal and marine birds, including the following:

- air pollution;
- pollution of coastal and offshore waters resulting from OCS oil- and gas-related activities, including platform and pipeline oil spills, produced waters, and any spill-response activities;
- structure presence and lighting (e.g., OCS platforms);
- aircraft and vessel traffic and oil-spill cleanup associated noise;
- maintenance and use of navigation waterways;
- habitat loss, fragmentation, and alteration from coastal facility and OCS oil- and gas-related support structure construction;
- OCS pipeline landfalls; and
- trash and debris.

The incremental contribution of the CPA proposed action to the cumulative impact is considered adverse but not significant because the effects of the most probable impacts, such as lease sale-related operational discharges and helicopters and service-vessel noise and traffic, are expected to be sublethal; and some displacement of local individuals or flocks may occur to other habitat, if available. In general, the net effect of habitat loss from oil spills, OCS oil- and gas-related pipeline landfalls, and maintenance and use of navigation waterways, as well as habitat loss and modification resulting from coastal facility construction and development, will probably reduce the overall carrying capacity of the disturbed habitat(s). That is, impacted habitats may result in reductions to both species composition (fewer species) and abundance (lower numbers) as compared with what the area supported historically. These would be the most serious cumulative impacts on birds. In addition to the factors listed above, there are several

non-OCS oil- and gas-related impact-producing factors that could potentially impact coastal and marine birds. These factors include the following: air pollution; habitat loss, alteration, and fragmentation associated with commercial and residential construction and industrial growth; water pollution including State or tanker oil- and gas-related spills and any spill-response activities and pollution of coastal waters resulting from municipal, industrial, and agricultural runoff and discharge; aircraft and vessel (including military) activities and noise; nonconsumptive and consumptive recreation; maintenance and use of navigation waterways; collisions with anthropogenic structures; predation; diseases; climate change and related impacts; impacts from storms and floods; fisheries interactions; and trash and debris. Impacts from non-OCS oil- and gas-related resources (including impacts from the State oil and gas program and associated structure collisions and spills, waste and debris, water pollution, and air pollution) on habitat and bird behavior operate in a way similar to the OCS oil- and gas-related impacts on each resource discussed previously in this chapter. Non-OCS oil- and gas-related impacts include avian habitat loss, alteration, and fragmentation associated with commercial and residential development, and maintenance and use of navigation waterways combined with the associated effects of climate change (including sea-level rise and the frequency and intensity of tropical storms. Oil spills, regardless of size, are but one of a myriad of anthropogenic avian mortality sources.

Mortality as a result of long migrations may also impact coastal and marine bird populations. Various passerine forest birds include a substantial migration (approximately tens of kilometers; Gauthreaux, 1975) over land at the end of their spring nonstop trans-Gulf flight. Such a flight over land may also occur before crossing the Gulf itself. The mortality rates of species during nonstop flight due to exhaustion of energy reserves are unknown. House cat predation is a threat mostly for passerines, which comprise most of the trans-Gulf migrants. Despite the number of waterfowl killed annually under Federal hunting laws, their populations remain strong. Sublethal effects on birds may also include interactions with commercial fisheries and noise disturbance from non-OCS oil- and gas-related air and vessel traffic.

In conclusion, the incremental contribution of the CPA proposed action to the cumulative impact is considered adverse but not significant when compared with the impacts of some of the reasonably foreseeable non-OCS oil- and gas-related factors.

New Information Available Since the Publication of 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS

A search of Internet information sources including published journal articles was conducted to determine the availability of recent information on coastal and marine birds. Websites visited included 5 for Federal agencies (U.S. Environmental Protection Agency [including its Gulf of Mexico Program], U.S. Geological Survey, National Oceanographic and Atmospheric Administration, U.S. Fish and Wildlife Service, and the Bureau of Ocean Energy Management), several for various stakeholders (Sierra Club, National Fish and Wildlife Foundation, Nature Conservancy, Gulf of Mexico Alliance, Barataria-Terrebonne National Estuary Program, National Audubon Society, Restoration Council), and NOAA Central Library's *Deepwater Horizon* Bibliography (Belter, 2014). Where applicable, websites of subdivisions of many of these organizations were also consulted. Environmental journal articles were also located online using four search engines (JSTOR, EBSCO, Google Advanced Scholar Search, and Google Advanced Book Search). Three of the search engines collectively searched all of the ecology journals of six major publishers (John Wiley and Sons, Springer, Elsevier Science, Taylor and Francis Group, Cambridge University Press, and Oxford University Press). The search revealed new information on the attraction of trans-Gulf nocturnally migrant birds to lights on platforms. Birds will likely stop over on platforms with lights with spectral red or with high intensity. This is likely only during overcast, rainy, or foggy conditions at night (Marquenie et al., 2013). Also, they might stop over if they encounter head winds that slow their trans-Gulf migration. At least sometimes, they may decline to stop over during overcast, rainy, or foggy conditions at night if the platform work lights are green or blue (Marquenie et al., 2013) and if the lights are of moderate (not high) intensity (Wiltschko and Wiltschko, 2001; Wiltschko et al., 2003). The cause-and-effect processes of lights and occurrence or absence of attraction to platforms and stopovers on platforms during migration are being investigated. They have not been rigorously determined (Wiltschko and Wiltschko, 2014; Ramirez et al., 2014). The cause-and-effect processes likely include an optical magnetic compass (with undetermined biochemistry) in the retinas of bird eyes, at least for some species. Small populations of birds may be affected by lights, which may

affect species richness (community structure). Effects may include positive (i.e., from resting and feeding) and/or negative (i.e., from nocturnal circulation and collisions) results of stopping over on platforms. Nocturnal circulation occurs when birds circle platforms at night and use up an unspecified amount of their migratory energy reserves. Negative impacts may in turn affect bird watching and bird hunting as economically valuable activities. Injury or mortality from collision or nocturnal circulation (after stopover) at the small population level for a long-term (10+ years) with almost full recovery means that impacts to trans-Gulf migrants will be major. Positive impacts for trans-Gulf migrants due to use of platforms as stopovers for resting and/or feeding may possibly compensate as much as completely for impacts of injury or mortality. Positive impacts of stopover may convert any major negative impacts of stopover to negligible impacts, but considerable uncertainty surrounds the impacts; therefore, further study is required. The impact of artificial light along the coast on birds has not been studied.

The search also revealed new information on the impact of the Deepwater Horizon incident on seabirds. Mortality from the *Deepwater Horizon* explosion, oil spill, and response is sufficient to cause a small negative shift in baseline abundances for seabirds. Total seabird mortality seaward of 25 mi (40 km) from shore due to the *Deepwater Horizon* explosion, oil spill, and response was estimated at 200,000 birds (Haney et al., 2014a). Estimates of breeding population sizes for the analyzed species were 60,000-15,000,000 for four procellariiform species, 9,000 for one pelecaniform species, and 96,000-500,000 for three charadriiform species (Haney et al., 2014a). In the NRDA Trustees' Final PDARP/PEIS, total offshore seabird mortality was separately determined for the *Deepwater Horizon* explosion, oil spill, and response as at least 2,317-3,141 birds (Industrial Economics, Incorporated, 2015a). The estimates presented in the Final PDARP/PEIS are about 1-2 percent of the mortality estimated by Haney et al. (2014a). "Offshore" was defined as deeper than the 200-m (656-ft) water depth and less than 40 km (25 mi) from shore or any depth 40 km (25 mi) or more from shore. The probable initial negative shifts in total baseline seabird abundance indicated by total seabird mortality due to the *Deepwater Horizon* explosion, oil spill, and response was insufficient to cause a change in the expected impacts to seabirds from proposed CPA Lease Sale 247.

Total coastal bird mortality shoreward of 25 mi (40 km) from shore was estimated by two models, culminating in estimates of 600,000 birds using one model and 800,000 birds using the other (Haney et al., 2014b). In perspective, in three analyzed species of seabirds, estimated losses due to the *Deepwater Horizon* explosion, oil spill, and response were 12 percent or more of the total population estimated present in the northern GOM (Haney et al., 2014b). This new information estimates a small negative shift in baseline numbers. The initial negative shift was insufficient to cause a change in the expected impacts to seabirds from the CPA proposed action. The shift was extrapolated from the increased mortality due to the *Deepwater Horizon* explosion, oil spill, and response. The work by Haney et al. (2014 and 2014b) is not for NRDA. Total nearshore waterbird mortality was separately determined in six recent final reports on NRDA for the *Deepwater Horizon* explosion, oil spill, and response as 54,099-100,134 waterbirds (USDOI, FWS, 2015a-e; Industrial Economics, Incorporated, 2015b). This is as low as 6.7 percent of the estimate by Haney et al. (2014b). The probable initial negative shifts in total baseline waterbird or coastal bird abundance indicated by total coastal bird or waterbird mortality due to the *Deepwater Horizon* explosion, oil spill, and response was insufficient to cause a change in the expected impacts to seabirds from proposed CPA Lease Sale 247.

Impacts from the *Deepwater Horizon* oil spill may have stopped in 2010 for northern gannets and in 2011 for tundra peregrine falcons. Franci et al. (2014) found no confirmed impacts of oil on the endocrine status, and no evidence of exposure to oil, of northern gannets that migrated to eastern Canada after overwintering in the northern Gulf of Mexico after the *Deepwater Horizon* explosion and oil spill in the winter of 2010-2011. Seegar et al. (2015) found evidence in the fall of 2010 of PAH contamination of the blood of migrant tundra peregrine falcons that probably were exposed to *Deepwater Horizon* PAHs in oil, but the blood of migrant tundra peregrine falcons found later in the spring and fall of 2011 were probably not contaminated with PAHs from *Deepwater Horizon* oil.

For some bird species, the NRDA Trustees' recently published Final PDARP/PEIS provides a projection of bird mortality resulting from the spill (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Final PDARP/PEIS also states that many other birds were injured through sublethal effects of oil exposure, habitat loss, displacement due to response actions, and reproduction foregone due to the loss of breeding adult birds (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). Many of these impacts were previously described in the NRDA studies summarized above.

Any additional (NRDA) information obtained from the *Deepwater Horizon* oil spill and response is unlikely to be so significant as to change the relative importance of non-OCS oil- and gas-related factors to bird populations, which is demonstrated in Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS and Table 4-2 of the WPA 233/CPA 231 Supplemental EIS.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in this Supplemental EIS and in the prior 2012-2017 Gulf of Mexico EISs, BOEM has identified incomplete information regarding coastal and marine birds in the CPA. This incomplete information may be relevant to the evaluation of adverse effects because it provides any change in the baseline environmental conditions for bird populations in the affected environment from the *Deepwater Horizon* oil spill, exacerbating any impacts from the CPA proposed action. Although a series of reports related to the impacts to birds has been completed as part of the NRDA process, additional data are still being developed through this process, which may take years to complete. In some cases other information cannot be obtained because it may take years to acquire and analyze through the NRDA process, producing a reliable, model-based estimate of mortality that accounts for detection-related issues (Flint et al., 1999; Byrd et al., 2009). Even after additional information is released, the impacts of the oil spill may be difficult or impossible to discern from other factors. It is not possible for BOEM to obtain this information and incorporate it into this analysis within the timeline contemplated by the NEPA analysis of this Supplemental EIS regardless of the costs or resources needed. At present, the best available information does not provide a complete understanding of the effects of the spilled oil or the recovery potential for the most impacted species (Tables 4-8, 4-12, and 4-13 of the 2012-2017 WPA/CPA Multisale EIS and Table 4-2 of the WPA 233/CPA 231 Supplemental EIS).

No Gulf of Mexico regional estimates are available for annual mortality rates from several anthropogenic sources of mortality. However, recent quantitative national estimates allow a qualitative but not quantitative extrapolation to the Gulf of Mexico. The national estimates include songbirds, and these are relevant because they may be impacted during trans-Gulf migration. An estimated range of national annual mortality from collision with vehicles is 62-275 million birds per year (Loss et al., 2014a). An estimate of national annual mortality from collision with buildings is 599 million birds per year (Loss et al., 2014b). Finally, an estimate of annual mortality from predation by free-ranging domestic cats is 1.4-3.7 billion birds per year (Loss et al., 2013). The mortality estimates are nationwide and not just for the northern Gulf of Mexico, where impacts would be much less. Loss et al. (2014b) provide unprecedented state-of-the-art science (Machtans and Thogmartin, 2014).They and others used species-specific local mortality estimates and an explicit treatment of known biases with acknowledged uncertainty in the final national estimate. All of this allowed extrapolation to total bird mortality on a national scale. It is imperfect but it is innovative science because the local studies were never designed to be used for extrapolation (Machtans and Thogmartin, 2014).

BOEM has identified incomplete information on avian mortality rates during migration, from both exhaustion and collisions with platforms. Various passerine forest birds include a substantial migration (approximately tens of kilometers; Gauthreaux, 1975) over land at the end of their spring nonstop trans-Gulf flight. Such a flight over land may also occur before crossing the Gulf of Mexico itself unless substantial forests are located near the shoreline. The mortality rates of species during nonstop flight due to exhaustion of energy reserves are unknown. This information may be relevant to the evaluation of adverse impacts from OCS oil- and gas-related activities because, at the present time, there is no way to discern if annual or long-term mortality from such activities, due mostly to collisions with platforms (over the life of newly installed platforms) for any of the affected trans-Gulf migrant species considered herein results in major population-level impacts (Russell, 2005, Chapters 17 and 18). Annual mortality may cause major impacts because it has been estimated at 200,000 birds (Russell, 2005). However, in lieu of this data gap, BOEM extrapolated existing information using accepted scientific methodologies to complete this analysis. Studies indicate that the numbers of birds successfully migrating across the Gulf in the spring are so great (on the order of magnitude of hundreds of millions; Russell, 2005) that any mortality associated with exhaustion from migration or collision with platforms would likely not exacerbate any cumulative impacts of other mortality factors. Birds suffering from exhaustion would typically be sick or weak, and their mortality would be a case of natural selection, where the populations

would be strengthened (made more fit). The potential range of a bird adapted to fatten up enough to cross extensive barriers like the open ocean or Gulf of Mexico may be approximated by data on shorebirds, which may be an accurate proxy for the maximum possible flight range of forest songbirds that may traverse the GOM. The computed maximum nonstop range of a bar-tailed godwit leaving Alaska (based on a model of fuel load) was all the way to the South Pole (Pennycuick and Battley, 2003). Given what we know about the life history characteristics of many of these species (e.g., age at first reproduction, clutch size, and nest success), as well as the estimate of maximum nonstop flight range, the potential for such major population-level impacts as a result of migration mortality seems relatively low (Arnold and Zink, 2011, page 2).

Additionally, the focus within this Supplemental EIS is on major (population- and ecosystem-level) impacts to bird management, protection, and conservation, as well as ecoregions and landscapes over the long term rather than impacts to individual birds and small sites over a short time. Therefore, although the body of available information on migratory mortality is incomplete and long-term effects are unknown, the evidence currently available supports the analyses in the prior 2012-2017 Gulf of Mexico EISs. The evidence does not indicate severe adverse impacts to coastal and marine bird populations as a result of migration mortality from collisions with platforms.

In summary, BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for coastal and marine birds presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for coastal and marine birds presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sales 247.

4.1.1.17. Gulf Sturgeon

BOEM has reexamined the analysis for Gulf sturgeon presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for Gulf sturgeon presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.17 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.17 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1.1.17 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

Potential impacts from routine activities to the threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*) and their designated critical habitat from routine activities associated with the CPA proposed action may occur from drilling and produced-water discharges, degradation of estuarine and marine water quality from infrastructure, dredging activities, vessel traffic, pipeline installation, and explosive platform removal. Designated Gulf sturgeon critical habitat is confined to State waters, and navigation channels are exempt from the critical habitat status. Most activities related to the CPA proposed action would occur in Federal waters (i.e., structure placement, drilling, removal, etc.). Though critical habitat may be impacted directly or indirectly, such impacts are expected to be negligible due to the distance of Gulf sturgeon habitat and life cycles from most activities related to the CPA proposed action.

Potential impacts from accidental events on Gulf sturgeon and the designated critical habitat may occur primarily from oil spills. Unusually low tidal events, increased wave energy, or the use of oil

dispersants increases the risk of impact with bottom-feeding and bottom-dwelling fauna. For this reason, dispersants are not expected to be used with coastal spills. Winds, currents, and outflow from the Mississippi River would also diminish the volume of a slick. The spreading of the slick would reduce the oil concentrations that would potentially impact the coastal Gulf sturgeon critical habitat. The potential risk to sturgeon would result from either direct contact with oil spills (or the potential PAHs introduced through the spill), exposure through their diet or, in some cases, long-term exposure to produced water or other water contaminants associated with extraction processes. If there is contact with spilled oil, it could have detrimental physiological effects on an individual Gulf sturgeon. Due to the distance of the activity from shore and Gulf sturgeon critical habitat, there is a minimal risk of any oil coming in contact with Gulf sturgeon from an offshore spill.

Cumulative Impacts

The cumulative impact from routine OCS oil- and gas-related operations includes oil spills. Potential non-OCS oil- and gas-related impact-producing factors considered in this analysis include natural catastrophes, fishing, and other factors that can result in changes to habitats.

Gulf sturgeon could be impacted by oil spills resulting from the CPA proposed action. The effects on Gulf sturgeon from contact with spilled oil from a proposed action would be sublethal (Berg, 2006). Other potential impacts may occur from drilling and produced-water discharges, bottom degradation of estuarine and marine water quality by nonpoint runoff from estuarine OCS oil- and gas-related facilities, vessel traffic, pipeline installation, and explosive removal of structures. However, because of regulations in place for critical habitats, these impacts are expected to have negligible effects on Gulf sturgeon and their designated critical habitat, and will not be discussed as part of the cumulative impacts analysis.

For a low-probability catastrophic spill, the proximity, type of oil, weather conditions, as well as the amount and location (distance offshore and water depth) of the dispersant treatment, may contribute to the severity of the spill's impact to the sturgeon and its habitat (for more information regarding a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, refer to **Appendix B**).

The Gulf sturgeon and its critical habitat can be cumulatively impacted by non-OCS oil- and gas-related activities including natural catastrophes, commercial fishing, State oil and gas activities, and other factors that can result in habitat changes. Recent climate trends and projections indicate more frequent and higher intensity storms, flooding, droughts, coastal erosion, and rising sea levels (Parry et al., 2007), all of which could impact Gulf sturgeon critical habitat, spawning areas and life history stages. Other naturally occurring events that can impact Gulf sturgeon may increase, such as the 1999 and 2005 red tides in Choctawhatchee Bay that resulted in sturgeon deaths (USDOI, FWS, 2000; State of Florida, Dept. of Environmental Protection, 2012) or El Niño/La Niña events, which can cause fish to extend or shift their range (USDOC, NOAA, 2013a). Deaths of adult sturgeon and potential habitat alterations are expected to occur from commercial fishing. Non-OCS oil- and gas-related accidental spills can happen, such as the 2008 industrial spill in the Pearl River in Louisiana that resulted in the mortality of juvenile and adult Gulf sturgeon (Kimmel and Constant, 2011) and the February 2013 spill of wastewater from a water pollution control plant into the Withlacoochee River in Georgia (Schaefer, 2013). While these events have happened recently and there is ongoing monitoring of the impacted areas, it is unknown how the related mortalities affect the Gulf sturgeon population. Upstream urbanization and commercial or residential development can adversely affect the water quality downstream and therefore can have potential cumulative impacts to Gulf sturgeon.

The CPA proposed action would not require dredging near natal rivers used as migratory routes to upstream spawning areas. While there could be a need for maintenance dredging not directly related to OCS oil- and gas-related activities in the nearshore waters, juvenile or adult sturgeon using these areas have the ability to avoid the regulated dredging activity.

On August 8, 2013, a notice of issuance of permits was published in the *Federal Register* for take of Gulf sturgeon for scientific research (*Federal Register*, 2013). Substantial damage to Gulf sturgeon critical habitat is expected from natural catastrophes and inshore alteration activities, such as dam building or maintenance dredging. As a result, it is expected that the Gulf sturgeon would experience a decline in population sizes and a displacement from their current distribution that would last more than one generation.

The incremental contribution of the CPA proposed action to the cumulative impacts on Gulf sturgeon is expected to be negligible. This is because the effect of contact between lease sale-specific oil spills and Gulf sturgeon is expected to be sublethal, and regulations and mitigations decrease impacts from routine events. Other non-OCS oil- and gas-related activities, including storms and anthropogenic factors on habitat, are expected to result in more incremental and cumulative impacts to this species. Non-OCS oil- and gas-related impacts are seen as the primary cumulative impacts on Gulf sturgeon, compared with the CPA proposed action, even in light of incomplete or unavailable information.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search was conducted for published journal articles on Gulf sturgeon, and various Internet websites (*Federal Register*, FWS, National Marine Fisheries Service, USGS, and Gulf Coast State Natural Resources websites) were examined to determine any recent information regarding this species.

The search revealed an article by Rudd et al. (2014) that used surgically implanted acoustic telemetry tags in Gulf sturgeon to examine spatial distribution and movement patterns. Fidelity rates in rivers in the spring and summer and overwintering in the Gulf of Mexico to feed were reconfirmed. These authors suggested that Gulf sturgeon should be managed by individual riverine populations. They suggested that western GOM populations may have higher mortality rates than eastern GOM populations. This new information about Gulf sturgeon and its critical habitat does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs.

The NRDA team has completed an assessment plan for nearshore resources following the *Deepwater Horizon* explosion, oil spill, and response. The goals set forth are to characterize the extent and distribution of nearshore sediment oiling, to model exposure of organisms in the water column and benthos to hydrocarbons in nearshore sediments, and to evaluate and quantify injury to nearshore benthic organisms (USDOC, NOAA, 2012). Work plans for this assessment can be found on NOAA's website (USDOC, NOAA, 2013b). Analyses of available data are unavailable.

The NRDA Trustees' recently published Final PDARP/PEIS provides a projection of the numbers of Gulf sturgeon potentially exposed to *Deepwater Horizon* oil (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Trustees also reported that they found evidence of genotoxicity and immunosuppression at a molecular, cellular, and organ level in sturgeon as a result of oil exposure (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. This incomplete information may be relevant to adverse effects because the PAH toxicity to similar fish (shortnose sturgeon, salmonids) varies substantially, although conclusions of the impacts of PAHs on fish are often generalized due to the difficulty in testing any specific chemical (Berg, 2006). The final determinations on damages to Gulf sturgeon resources from the *Deepwater Horizon* explosion, oil spill, and response will ultimately be made through the NRDA process. The NRDA Trustees' recently published Final PDARP/PEIS provides some preliminary information about *Deepwater Horizon* impacts to Gulf sturgeon (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The *Deepwater Horizon* explosion, oil spill, and response will ultimately allow a better understanding of any realized effects from a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur. This information cannot be obtained because the means to obtain it are not known and because related information already in development has not been released from the NRDA process.

BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. For example, studies such as Malins et al. (1985), O'Conner and Huggett (1988), Fabacher et al. (1991), Varanasi et al. (1992), Bateman and Brim (1994), Baumann et al. (1996), Matthiessen and Sumpter (1998), and Berg (2006) indicated no reasonably foreseeable significant adverse impacts from oil spills related to the proposed action. In the rare event that Gulf sturgeon have contact with oil, this could cause sublethal effects,

including causing the fish to temporarily migrate from the affected area, irritation of gill epithelium, an increase of liver function in a few adults, and possibly interference with reproductive activity. The juvenile and subadult Gulf sturgeon, at a minimum, seasonally use the nearshore coastal waters and could potentially be at risk from both coastal and offshore spills. Due to the distance of the proposed activity from shore and the Gulf sturgeon critical habitat, there is a minimal risk of any oil coming in contact with Gulf sturgeon from an offshore spill. Indeed, there is little risk of most routine activities impacting Gulf sturgeon for the same reasons. Therefore, BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for Gulf sturgeon presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for these Gulf sturgeon presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.18. Fish Resources and Essential Fish Habitat

BOEM has reexamined the analysis for fish resources and essential fish habitat (EFH) presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for fish resources and EFH presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.18 and Appendix D of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.18 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.18 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. Also, EFH is discussed in the following chapters of this Supplemental EIS: water quality (**Chapter 4.1.1.2**); wetlands (**Chapter 4.1.1.4**); seagrass communities (**Chapter 4.1.1.5**); live bottoms (**Chapter 4.1.1.6**); topographic features (**Chapter 4.1.1.7**); *Sargassum* communities (**Chapter 4.1.1.8**); chemosynthetic deepwater benthic communities (**Chapter 4.1.1.9**); nonchemosynthetic deepwater benthic communities (**Chapter 4.1.1.10**); and soft bottom benthic communities (**Chapter 4.1.1.11**). The following information is a summary of the resource description and impact analysis incorporated from the prior 2012-2017 Gulf of Mexico EISs. Any new information that has become available since those documents were published is presented below.

The Gulf of Mexico supports a great diversity of fish. The distribution of fish species is related to variable ecological factors that include salinity, primary productivity, and bottom type. These factors differ widely across the Gulf of Mexico and between the inshore and offshore waters. Characteristic fish resources are associated with the various environments and are not randomly distributed.

Impacts of Routine Activities and Accidental Events

Effects on fish resources and EFH from routine activities associated with the CPA proposed action could result from coastal and marine environmental degradation as a result of construction activities (i.e., from onshore facilities to well-site construction activities, including board roads, ring levees, and impoundments), pipeline trenching, offshore discharges of drilling muds and produced waters, anchor and anchor chain placement, and structure emplacement and removal. Since the majority of fish species within the CPA are estuary dependent, any modification of the coastal environment resulting from the CPA proposed action has the potential to adversely affect EFH and fish resources through the loss of nursery habitat or functional impairment of existing habitat through decreased water quality (Chambers, 1992; Stroud, 1992). Although the potential exists, it is expected that any possible coastal and marine environmental degradation from the CPA proposed action would have little effect on fish resources or EFH.

With the CPA proposed action, BOEM projects no new coastal infrastructure with the exception of a potential new pipeline landfall and a potential new gas processing facility. Although the installation of pipelines has the potential to temporarily resuspend sediment in localized areas, this is expected to have a negligible impact. Depending on the sediment characteristics, sediment load, and duration of exposure, impacts to commercially valuable species within a sediment plume can vary. Responses range in severity from no effect to mortality, but mobile species can avoid severe effects by limiting exposure. Sessile organisms and those with limited mobility may be exposed for longer durations, leading to increasingly severe impacts (e.g., increased respiratory rates, reduced feeding, and mortality). Regulations, mitigations, and practices reduce the undesirable effects on coastal habitats from dredging and other construction activities; permit requirements should ensure that pipeline routes avoid sensitive coastal habitat types. At the expected level of impact, the resultant influence on fish resources would be short term and localized, affecting only small portions of fish populations and selected areas of EFH. As a result, there would be little disturbance to fish resources or EFH by new infrastructure.

The primary impacting sources to water quality in coastal waters are point-source and storm-water discharges from support facilities, vessel discharges, and nonpoint-source runoff. These activities are not only highly regulated but also localized and temporary in nature. The impacts to coastal water quality from routine activities associated with the CPA proposed action should be minimal because of the distance to shore of most routine activities and USEPA regulations that restrict discharges. Offshore water quality is affected temporarily and in a limited area by the discharge of produced water and the overboard discharge of drilling muds. Maintenance dredging and canal widening in inshore areas causes only the temporary suspension of sediments. Negative impacts from most of these routine operations would require a short time for fish resources to recover. This is because of multiple life history and environmental factors such as fecundity or year-class recruitment through oceanographic circulation.

Offshore, many of the EFHs are protected under the stipulations and regulations currently in place. Without these measures, there could be major negative impacts to topographic features and live bottoms. However, with routine impact-producing factors mitigated by BOEM through the Topographic Features Stipulation and the Live Bottom (Pinnacle Trend and Low Relief) Stipulation, negative impacts are expected to be avoided. These stipulations establish a No Activity Zone around BOEM-protected topographic features, such as the Flower Gardens Banks. Additionally, NTL 2009-G39 and NTL 2009-G40 advise operators of BOEM's distancing requirements for bottom-disturbing activity from identified seafloor features (i.e., live bottoms, Pinnacles, topographic features, potentially sensitive biological features, and features capable of supporting high-density deepwater benthic communities). Hard substrate habitat provided by structure installation in areas where natural hard bottom is rare will also tend to increase fish populations or attract fish populations. The removal of these structures will eliminate that habitat, except when decommissioned platforms are used as artificial reef material. This practice is expected to increase over time. A more detailed discussion of decommissioning and the impacts of these activities on marine fishes can be found in **Chapters 3.1.1.10 and 4.1.1.19**, respectively.

For these reasons, as well as the fact that Gulf of Mexico fish stocks have retained both diversity and relatively stable biomass throughout the years of offshore development and other disturbances, the CPA proposed action is expected to result in a minimal decrease in fish resources and/or standing stocks or in EFH.

Accidental disturbances resulting from the CPA proposed action, including oil or chemical spills, have the potential to adversely affect fish resources and EFH within the CPA. If oil or chemical spills due to the CPA proposed action were to occur in open waters of the OCS proximate to mobile adult finfish, the effects would likely be nonfatal and the extent of damage would be reduced because adult fish have the ability to move away from a spill, metabolize hydrocarbons, and excrete both metabolites and parent compounds. Weathered crude oil has been shown in laboratory experiments and field research to cause a range of sublethal effects, including malformation, genetic damage, and physiological impairment in different life history stages of different fish species (Whitehead et al., 2011; Brewton et al., 2013; Incardona et al., 2014; Mager et al., 2014). Oil can be lethal to fish, especially in larval and egg stages, since early life stages of animals are usually more sensitive to environmental stress than adults (Moore and Dwyer, 1974) and are unable to avoid spills, putting early development stages at greater risk. Therefore, fish populations would primarily be affected if oil reaches the coastal and estuarine areas because many species reside in estuaries for at least part of their life cycle or are dependent on the nutrients exported from the estuaries to the shelf region. However, pelagic species may also be affected. Offshore spawning and nursery habitat supports several valuable species that could likewise be impacted

by widespread contamination of the epipelagic region. However, due to natural variability in spawning success, recruitment, oceanographic conditions, and other factors, it is difficult to attribute specific causes to short-term shifts in stocks, and research to date has been inconclusive with respect to the individual contributions of the many factors impacting these fishes (Rijnsdorp et al., 2009; Atlantic Bluefin Tuna Status Review Team, 2011; Rooker et al., 2013). The probability of a spill impacting these nursery habitats is low. Much of the coastal northern Gulf of Mexico is a moderate- to high-energy environment; therefore, sediment transport and tidal stratification should reduce the chances for oil persisting in these areas if they are oiled. The extent to which a spill could impact offshore spawning and nursery habitat is highly dependent upon the time of year of the event.

The effect of oil spills that may be associated with the CPA proposed action on fish resources is expected to cause a minimal decrease in standing stocks of any population because most spill events would be small in scale and localized, relative to species' overall distributions. Historically, there have been no oil spills of any size in the Gulf of Mexico that have had a long-term impact on fishery populations. Although many potential effects of the *Deepwater Horizon* explosion, oil spill, and response have been alleged, the actual effects are largely unknown and likely to remain so for several years, until more research is completed and the analyses become available. Recent analysis of early stage survival of fish species inhabiting seagrass nursery habitat from Chandeleur Islands, Louisiana, to St. Joseph Bay, Florida, pre- and post-*Deepwater Horizon* oil spill show that immediate catastrophic losses of 2010 cohorts were largely avoided and that no shifts in species composition occurred following the spill (Fodrie and Heck, 2011). Analysis of the effects of a low-probability catastrophic oil spill can be found in **Appendix B**. The fish populations of the Gulf of Mexico have repeatedly proven to be resilient to large, annually occurring areas of hypoxic conditions, major hurricanes, and oil spills. Accidental events from the CPA proposed action are not expected to significantly affect fish populations or EFH in the Gulf of Mexico.

Cumulative Impacts

There are widespread anthropogenic and natural factors that impact EFH and fish populations in the GOM. These include OCS oil- and gas-related and non-OCS oil- and gas-related factors. The OCS oil- and gas-related activities that could impact fish resources and EFH include construction, pipeline and structure emplacement, anchor and anchor chain placement, drilling and produced-water discharges, structure removal, and oil spills. The routine OCS oil- and gas-related activities have the potential to impact fish and degrade EFH, but they would probably only have a minimal effect on fish resources and EFH because of the regulations, mitigations, and permit reviews that are applied for OCS oil- and gas-related activity. Oil spills, although considered rare events, can affect seagrass beds through physical oiling and destruction from oil-spill cleanup. Low-probability catastrophic spills, which are not part of the CPA proposed action and not likely expected to occur, similar to the *Deepwater Horizon* explosion and oil spill are analyzed in **Appendix B**. Overall, the incremental contribution of OCS oil- and gas-related impacts to fish populations and EFH is minor due to regulations, mitigations, and permit reviews.

Non-OCS oil- and gas-related factors that can impact fish resources and EFH include State oil and gas activity, inshore pollutants, dredging, coastal development, human population expansion, commercial and recreational fishing, overfishing, and natural phenomena. Inshore inputs of pollutants to estuaries from runoff and industry are contributors to wetland loss and the degradation of water quality. Fish are known to avoid any area of adverse water quality, such as hypoxia (Wannamaker and Rice, 2000; Craig and Bosman, 2013). Canal dredging primarily accommodates commercial, residential, and recreational development, and increased population and commercial pressures on the Gulf Coast are also causing the expansion of ports and marinas. Resource management agencies, both State and Federal, set restrictions and issue permits in an effort to mitigate the effects of development projects and industry activities. The Federal and State governments are also funding research and coastal restoration projects; however, it may take decades of monitoring to ascertain the feasibility and the long-term effectiveness of these coastal restoration efforts.

Overfishing (including bycatch) has contributed to population effects seen with GOM fishes. The Magnuson-Stevens Fishery Conservation and Management Act and its amendments address sustainable fisheries and set guidelines for protecting marine resources and habitat from fishing- and nonfishing-related activities. Under this Act, fisheries management plans, including limits on catch and fishing

seasons, are developed and proposed by the regional fisheries management councils for approval and implementation by NMFS. State agencies regulate inshore fishing seasons and limits.

Some natural phenomena can impact fish resources and EFHs. Nearshore habitat can be affected through events such as severe storms and floods. These events can accelerate wetland loss or damage oyster reef habitat. Offshore resources such as biologically sensitive underwater features may be damaged or buried by events like storms or turbidity flows, potentially affecting fish resources. Additionally, variability in spawning success and juvenile survival directly affect Gulf of Mexico fish populations. These natural phenomena are all continual, integral elements of the ecosystem, and impacts attributed to these events are often exacerbated by anthropogenic activities.

While all of these events and activities cause some sort of effect on the different EFHs and fish resources, many anthropogenic inputs, including the CPA proposed action, are now monitored, regulated, and mitigated by the permitting agency or State. The CPA proposed action would add a minimal amount to the overall cumulative effects.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search of Internet information sources and scientific journals was conducted to determine the availability of recent information (including NMFS's databases, the Gulf of Mexico Fishery Management Council's website, Science Direct, EBSCO, Elsevier, PLoS ONE, JSTOR, and BioOne). This search revealed new information relevant, but not essential, to an analysis of the potential impacts of OCS oil- and gas-related activities on fish resources and EFH. The following studies investigated the impacts of acute and chronic hydrocarbon exposure on juvenile and adult life stages of species and the rate of incidence for histopathologic lesions and other physiological effects in fishes associated with particular habitats or feeding strategies: Murawski et al. (2014); Brown-Peterson et al. (2015); Millemann et al. (2015); and Snyder et al. (2015). In general, studies suggest that impacts are spatiotemporally limited and that fishes have experienced reduced incidence of oil-related effects over time; however, accumulations in some species indicate continued exposure, potentially resulting in long-term effects. This information serves to expand our understanding of the potential impacts an oil spill may have on valuable marine species. A review of literature by Fodrie et al. (2014) examines evidence of oil-related impacts on fishes and the lack of detectable population-level effects. This review proposes mechanisms that could explain the apparent discrepancy, such as masking by biological and environmental factors, natural population variability, other anthropogenic disturbances, and compensatory processes. This analysis supports previous conclusions reached by BOEM and suggests research that could improve future assessment efforts. The NRDA Trustees documented impacts to both fish resources and essential fish habitat in the recently published Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Final PDARP/PEIS documents mortality in developing fish larvae exposed to the surface slick, and using information on oil toxicity and environmental exposures, also developed projections of mortality and production foregone due to the loss of larval fish. Additional injury projections were made for the upper water column as well as for deep waters. However, the Final PDARP/PEIS also noted that there were no apparent systemwide population crashes to surveyed fish species. The *Deepwater Horizon* oil spill's impacts were also documented for *Sargassum* and a variety of coastal habitats, including coastal wetlands, submerged aquatic vegetation, and oyster reef habitats.

Overall, newly available information supports and reaffirms the conclusions reached in the prior 2012-2017 Gulf of Mexico EISs. Therefore, the analysis and potential impacts discussed in those NEPA documents still apply for proposed CPA Lease Sale 247.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. Even with the recent publication of the Final PDARP/PEIS, BOEM has identified incomplete information regarding impacts of the *Deepwater Horizon* explosion, oil spill, and response or other oil exposure on fish resources and EFH in the CPA. This incomplete information may be relevant to evaluating adverse effects because the full extent of the potential impacts

on fish resources and EFH are not known. Relevant data on fish resources and EFH after the *Deepwater Horizon* explosion, oil spill, and response may take years to acquire and analyze. Much of these data are being developed through the NRDA process, which may take years to complete. Therefore, it is not possible for BOEM to obtain this information within the timeline contemplated in the NEPA analysis of this Supplemental EIS, regardless of the cost or resources needed.

BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. Although the body of available information is incomplete and the long-term effects cannot yet be known, the evidence currently available supports past analyses and is not indicative of significant population-level responses. Therefore, BOEM has determined that the incomplete information is not essential to a reasoned choice among the alternatives. Additional information on commercially and recreationally valuable species can be found in **Chapters 4.1.1.19 and 4.1.1.20**, respectively.

Summary and Conclusion

BOEM has reexamined the analysis for fish resources and EFH presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for the fish resources and EFH presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.19. Commercial Fisheries

BOEM has reexamined the analysis for commercial fisheries presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for commercial fisheries presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.19 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.19 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.19 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors include seafloor disturbing activities (e.g., pipeline installation, infrastructure emplacement, and dredging), waste discharge (e.g., drilling muds, cuttings, and produced waters), explosive severance operations (decommissioning and structure removal), and space-use conflicts (e.g., seismic surveys and structure emplacement). Some of these factors have the potential to indirectly impact commercial fisheries through degradation or loss of habitat. Healthy fish stocks depend on EFH, which is defined in the Sustainable Fisheries Act as "those waters and substrate necessary to fish for spawning, breeding, feeding, and/or growth to maturity." Since the majority of commercially harvested species within the CPA are estuary-dependent, coastal environmental degradation resulting from the CPA proposed action has the potential to adversely affect EFH and commercially valuable fishes. However, analysis of routine OCS oil- and gas-related activities, such as pipeline trenching, maintenance dredging, canal construction, and OCS discharge of drilling muds and produced water, has identified only short-term localized disturbances that minimally impact commercially valuable fish species and associated EFH. Resuspended sediments and offshore discharges settle or dissipate rapidly, limiting both the area affected and the duration of the effect. Additionally, regulations, mitigations, and current practices reduce the undesirable effects of construction and operational activities on coastal and offshore habitats. At the expected level of impact, the resultant influence on fish resources would be indistinguishable from natural fluctuations and other anthropogenic influences.

Fish mortality as a result of decommissioning operations is an example of OCS oil- and gas-related activities directly impacting fishes. However, a study of structure removals employing explosive severance methods found that associated mortality for three commercially important fishes did not significantly alter projected stocks (Gitschlag et al., 2000). To account for inherent variations in species composition and abundance among platforms (e.g., Stanley and Wilson, 1997; Gitschlag et al., 2000; Stanley and Wilson, 2000; Wilson et al., 2003), mortality estimates were doubled and stock estimates were recalculated. Although the study was limited and cannot be directly applied to all species or habitats, it is reasonable to assume that other commercially important fishes would respond similarly. At the projected rate of removal, these activities are not expected to have a substantial negative impact on stocks of commercially important fishes or, by extension, the associated fisheries.

Space-use conflicts could result directly from OCS oil- and gas-related activities that restrict or prevent other users from accessing OCS resources. For example, seismic surveys and structure emplacement represent short-term and semi-permanent obstructions, respectively. Although studies have shown airguns can produce behavioral responses in fishes, possibly even resulting in species- or gear-specific effects on catch rate (Popper and Hastings, 2009; Fewtrell and McCauley, 2012; Løkkeborg et al., 2012), there is insufficient data to consistently predict responses and important variables, such as the duration of exposure and repeated exposure. Commercial fisheries' impacts related to seismic surveys are not fully understood. The OCS structures present a minor space-use conflict when compared with the area available for commercial fishing. In addition, the current paradigm posits these structures act as both fish-attracting and production-enhancing devices, depending upon the species (Carr and Hixon, 1997; Gallaway et al., 2009; Shipp and Bortone, 2009). The resultant assemblages frequently include commercially valuable fishes, such as tunas (*Thunnus* spp.), red snapper (*Lutjanus campechanus*), and wahoo (*Acanthocybium solanderi*). Therefore, OCS structures may either enhance or obstruct commercial fishing, depending upon gear type (e.g., hydraulic reel, greenstick, trawl, and long-line) and target species. For more information, refer to **Chapters 4.1.1.18 and 4.1.1.20**.

Accidental events that could impact commercial fisheries are very limited. Oil spills on the OCS that are >1 bbl due to the CPA proposed action are highly unlikely (Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS). An oil spill would likely lead to commercial fishing closures in the vicinity of the oil spill. If oil spills due to the CPA proposed action were to occur in open waters of the OCS proximate to mobile adult finfish, the effects would likely be nonfatal and the extent of damage would be reduced because adult fish have the ability to avoid adverse water conditions. This behavioral mechanism allows mobile fishes to move away from the source of the hydrocarbons, thereby minimizing exposure. However, larval and juvenile life stages are typically more vulnerable than adults and would be expected to suffer significant adverse effects as a result of acute oil exposure (Brewton et al., 2013; Incardona et al., 2014; Mager et al., 2014). Species-specific response, duration of exposure, and hydrocarbon concentration are critical factors in determining short- and long-term effects, but BOEM conservatively assumes larval and juvenile fishes exposed to oil in close proximity to the point of accidental release would be expected to experience mortality. The probability of an offshore spill impacting nearshore environments is low, and spilled oil would generally be volatilized or dispersed by currents in the offshore environment prior to impacting inshore nursery habitat. Overall, the commercial fish and shellfish populations have remained healthy in the Gulf of Mexico despite ongoing anthropogenic and natural disturbances.

Cumulative Impacts

The cumulative analysis considers activities that have occurred, are currently occurring, and could occur and adversely affect commercial fisheries by harming fishes and affecting landings, or the value of those landings, for the years 2012-2051. These activities include the effects of the OCS Program (proposed action and prior and future OCS lease sales) resulting from pipeline installation, channel dredging, waste discharge, decommissioning operations, seismic surveys, and structure emplacement. In recent years, decommissioning operations have exceeded structure emplacements, resulting in a decrease in the total number of OCS platforms. BOEM expects this trend to continue throughout the OCS Program, further reducing the potential for impacts to commercial fisheries through space-use conflicts. Although the decommissioning process frequently employs explosive severance methods, which result in localized mortality of fishes, the cumulative impact to commercially valuable stocks is expected to be

indistinguishable from natural fluctuations and the effects of commercial and recreational fishing activity. For information on impacts resulting from catastrophic spills, refer to **Appendix B**.

Non-OCS oil- and gas-related factors include State oil and gas activity, coastal development, natural phenomena, and commercial and recreational fishing. Although some OCS oil- and gas-related activities contribute incrementally to the degradation and loss of wetland habitat (**Chapter 4.1.1.4**), the cumulative impact is small in comparison with the combined effect of State oil and gas development; coastal commercial, residential, and agricultural development; levees; river channelization; and episodic natural phenomena. The cumulative direct impact to commercial fisheries through a reduction in resources (fishable area and fish stocks) is negligible.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

BOEM has examined newly available information for findings that may impact the analyses of routine activities, accidental events, and cumulative impacts and that may potentially alter previous conclusions. A search of Internet information sources and scientific journals was conducted to determine the availability of recent information (including NMFS's databases, the NOAA Gulf Spill Restoration Publications website, the Gulf of Mexico Fishery Management Council website, Science Direct, EBSCO, Elsevier, PLoS ONE, JSTOR, and BioOne). This search revealed new information relevant, but not essential, to an analysis of the potential impacts of OCS oil- and gas-related activities on commercial fisheries. Several recent studies investigated the impacts of acute and chronic hydrocarbon exposure on juvenile and adult life stages of species and the rate of incidence for histopathologic lesions and other physiological effects in fishes associated with particular habitats or feeding strategies (Murawski et al., 2014; Brown-Peterson et al., 2015; Millemann et al., 2015; Snyder et al., 2015). In general, studies suggest that impacts are spatiotemporally limited and that fishes have experienced a reduced incidence of oil-related effects over time; however, accumulations in some species indicate continued exposure, potentially resulting in long-term effects. This information serves to expand our understanding of the potential impacts an oil spill may have on valuable marine species. A review of literature by Fodrie et al. (2014) examines the recent evidence of oil-related impacts on fishes and the lack of detectable population-level effects. This review proposes mechanisms that could explain the apparent discrepancy, such as masking by biological and environmental factors, natural population variability, other anthropogenic disturbances, and compensatory processes. This analysis supports previous conclusions reached by BOEM and suggests research that could improve future assessment efforts. Other new information was found in the NRDA Trustees' recently published Final PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The NRDA Trustees' Final PDARP/PEIS documents mortality in developing fish larvae exposed to the surface slick and, using information on oil toxicity and environmental exposures, developed projections of mortality and production foregone of larval fish. However, the Final PDARP/PEIS also noted that there were no apparent systemwide population crashes to surveyed fish species (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

Overall, the newly available information supports and reaffirms the conclusions reached in the prior 2012-2017 Gulf of Mexico EISs. Therefore, the analysis and potential impacts discussed in those NEPA documents still apply for proposed CPA Lease Sale 247.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. BOEM has identified incomplete information regarding impacts of the *Deepwater Horizon* explosion, oil spill, and response or other oil exposure on commercially valuable fish resources in the CPA, impacts related to explosive structure removal and impacts related to seismic surveys. This incomplete information may be relevant to evaluating adverse effects because the full extent of long-term adverse impacts to fishes from acute and chronic exposure to oil, explosive structure removal and seismic surveys are not known. Even with the recent release of the Deepwater Horizon oil spill Programmatic Damage Assessment and Restoration Plan and Final Programmatic

Environmental Impact Statement, relevant data on the potential impacts to fishes after the *Deepwater Horizon* explosion, oil spill, and response may take years to acquire and analyze. Therefore, it is not possible for BOEM to obtain this information within the timeline contemplated in the NEPA analysis of this Supplemental EIS, regardless of the cost or resources needed.

BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. Although the body of available information is incomplete and the long-term effects cannot yet be known, the evidence currently available supports past analyses and is not indicative of significant population-level responses. Therefore, BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives. Additional information on fish resources and EFH, and recreationally valuable species can be found in **Chapters 4.1.1.18 and 4.1.1.20**, respectively.

Summary and Conclusion

BOEM has reexamined the analysis for commercial fisheries presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for commercial fisheries presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.20. Recreational Fishing

BOEM has reexamined the analysis for recreational fishing presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new information was discovered that would alter the impact conclusion for recreational fishing presented in those NEPA documents. The analyses and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.20 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.20 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.20 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

Activities during the initial phases of the CPA proposed action, such as seismic surveying operations and other forms of vessel traffic, may lead to some space-use conflicts with recreational fishermen. Vessel traffic during subsequent infrastructure emplacement and production operations could also lead to some space-use conflicts with recreational fishing activities. The OCS oil- and gas-related activities could also affect the aesthetics of fishing in a particular location, which could dissuade anglers from fishing in specific locations. Some activities arising from proposed CPA Lease Sale 247, such as construction activities and discharges of muds and produced water, may also lead to low-level environmental degradation of fish habitat (**Chapter 4.1.1.18**), which would negatively impact recreational fishing activity. However, these minor negative effects would likely be outweighed by the beneficial addition of hard substrate and complex habitat provided by oil and gas infrastructure. The level of participation in any particular State Rigs-to-Reefs program will be an important determinant of the long-term impact of the CPA proposed action on recreational fishing activity. As structures are scheduled for decommissioning, a higher level of participation may benefit fishermen through the retention of complex habitat and potentially enhanced production for some recreationally desirable species, as opposed to structure removals (particularly those that use explosives) that can negatively impact the recreational activity that depends on any particular platform. In aggregate, the impacts of the CPA proposed action on recreational fishing activity are expected to be minor.

Oil spills can arise from accidents with respect to vessels, pipelines, drilling operations, or production operations. An oil spill would likely lead to recreational fishing closures in the vicinity of the oil spill. Small-scale spills should not affect recreational fishing to a large degree due to the likely availability of substitute fishing sites in neighboring regions. The longer-term effects of an oil spill will be determined by its effects on fish populations (**Chapter 4.1.1.18**), as well as by its effects on people and firms that support recreational fishing activity. Some of these effects will be similar to the effects on species that are important to commercial fishing activity, which are discussed in **Chapter 4.1.1.19**.

Cumulative Impacts

The cumulative analysis considers the effects of impact-producing factors related to OCS oil and gas, along with non-OCS oil- and gas-related impacts that may occur and adversely affect recreational fishing in the same general area of the CPA proposed action. The proposed CPA lease sale will contribute to the impacts of the broader OCS Program. This includes the space-use impacts arising from vessel traffic and construction operations, as well as the low-level environmental degradation to fish habitats that could occur. The proposed CPA lease sale will also incrementally add to the probabilities of oil spills, which could affect recreational fishing activity in the short term. Low-probability catastrophic oil spills, which are not part of the CPA proposed action and not likely expected to occur, could also impact recreational fishing and are described in **Appendix B**. The proposed CPA lease sale could also have positive impacts to recreational fishing activity since OCS oil and gas platforms often serve as reefs for fish populations, although removals of these platforms could have negative impacts on recreational fishing activity. However, these negative effects would be partially offset if some platforms are redeployed as artificial reef substrate through Rigs-to-Reefs programs.

Recreational fishing activity could also be influenced by a number of non-OCS oil- and gas-related factors, such as commercial, military, recreational, and industrial activities; natural processes; wetlands loss; hypoxia events; fish kills; water quality degradation; fisheries management plans; hurricanes; State oil and gas activities; State artificial reef programs; tourism (refer to **Chapter 4.1.1.21**); and other economic factors (refer to **Chapter 4.1.1.23.3**). Many of these impacts will be determined by the cumulative impacts to fish populations, which are discussed in **Chapter 4.1.1.18**. However, recreational fishing activity is driven by unique economic and tourism trends (refer to **Chapters 4.1.1.21 and 4.1.1.23.3**). It can also be influenced by the quality of fishing grounds, such as wetland areas, which can be degraded by hurricanes. Military activities, recreational vessel traffic, and other forms of vessel traffic could also cause space-use conflicts with recreational fishermen. However, it is likely that Fisheries Management Plans of the Federal and State governments would serve to keep overall recreational fishing activity reasonably stable through time. The incremental contribution of the CPA proposed action to these positive and negative cumulative impacts would be minimal because of the relatively small amount of activity expected with the CPA proposed action.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

BOEM examined a variety of Internet sources, as well as known data providers, for new information regarding the impacts of the CPA proposed action on recreational fishing. Ajemian et al. (2015) analyzed the fish populations at operational platforms, decommissioned platforms that were reefed using a variety of methods, and liberty ship reefs offshore Texas. This study found that recreationally important species such as red snapper (*Lutjanus campechanus*) were prevalent among all types of platform structures, suggesting that the reefing of a platform could maintain some of the properties desired by recreational fishermen. Information found in the Final PDARP/PEIS identifies that impacts to larvae fish exposed to the surface slick resulted in almost a 100-percent mortality and that oil concentrations in other water column zones exceeded levels known to cause mortality and sublethal effects to larvae fish (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). The Final PDARP/PEIS also indicates that populations of some directly affected fish species do not appear to have suffered a lasting impact, and population crashes to surveyed fish have not been detected (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016). Hutt et al. (2015) presents baseline information regarding the economic contributions of bait and tackle stores in the Gulf of Mexico, which improves BOEM's

understanding of the affected environment for recreational fishing. For example, this study finds that $266 million in bait and tackle sales support $160 million in labor income and 4,402 jobs, which provides insights regarding the affected environment for recreational fishing. Finally, the Gulf of Mexico Fishery Management Council (2015) summarized the most recent recreational fishing regulations in the Gulf of Mexico. For example, this document describes the recreational fishing seasons for red snapper (*Lutjanus campechanus*), red grouper (*Epinephelus morio*), and greater amberjack (*Seriola dumerili*).

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the impact conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information related to recreational fishing related to the *Deepwater Horizon* explosion, oil spill, and response. This incomplete information may be relevant to evaluating adverse effects because the full extent of the potential cumulative impacts on recreational species arising from the *Deepwater Horizon* explosion, oil spill, and response are not known. This information is relevant because it would allow BOEM to more accurately estimate the scales of recreational fishing activity in future time periods. The NRDA Trustees' Final PDARP/PEIS provides some information about fish larvae impacts, which are summarized above. There is also uncertainty regarding the extent to which recreational fishing is dependent upon OCS oil and gas platforms. BOEM is planning to undertake a study project to examine this issue, although the results from this study project will not be released within the timeline contemplated in the NEPA analysis of this Supplemental EIS.

BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. For example, BOEM has used data on recreational fishing activity provided by NMFS, which allowed BOEM to examine trends in recreational fishing over time. BOEM does not expect the missing information to significantly change its estimates of the impacts of the OCS Program on recreational fishing activity because BOEM still has enough baseline data to reasonably estimate impacts. Therefore, BOEM has determined that the incomplete or unavailable information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for recreational fishing presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new information was discovered that would alter the impact conclusion for recreational fishing presented in the prior 2012-2017 Gulf of Mexico EISs because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.21. Recreational Resources

BOEM has reexamined the analysis for recreational resources presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for recreational resources presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.21 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.21 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1.1.21 of the CPA 235/241/247 Supplemental EIS, and Chapter 4.1.1.21 of the CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

Routine OCS oil- and gas-related activities in the CPA can cause various disturbances to recreational resources. For example, marine debris can noticeably affect the aesthetic value of coastal areas, particularly beaches. Many mitigating measures have been adopted and incorporated into regulations and/or guidelines governing OCS oil and gas exploration, development, and production activities. Regulations and NTLs include safeguards and protective measures, which are in place to reduce impacts of marine trash and debris and other impact-producing factors associated with OCS oil- and gas-related activities. Vessel noise and the visibility of OCS oil and gas infrastructure can also conflict with some recreational activities. Similarly, vessel traffic can cause space-use conflicts with recreational activities. The OCS oil- and gas-related activities can also change the composition of local economies through changes in employment, land use, and demand for activities related to recreation and tourism. The presence of OCS oil and gas platforms can enhance some recreational activities such as fishing and diving, although the removal of a platform at decommissioning could reduce recreational opportunities. However, the small scale of the CPA proposed action relative to the scale of the existing oil and gas industry suggests that these potential impacts on recreational resources are likely to be minimal.

The NPS has raised concerns about impacts to national parks located along the Gulf Coast. Economic benefits associated with these national parks have been evaluated in Cullinane-Thomas et al. (2015). The number of visitors and the amount of visitor spending supported by each national park along the Gulf Coast are as follows: Padre Island National Seashore (Texas) (578,814 visitors; $23,892,700); Jean Lafitte National Historical Park and Preserve (Louisiana) (445,524 visitors; $24,986,300); Gulf Islands National Seashore (Mississippi and Florida) (4,455,240 visitors; $185,611,000); De Soto National Memorial (Florida) (342,039 visitors; $19182,600); Big Cypress National Preserve (Florida) (1,192,856 visitors; $91,111,200); Everglades National Park (Florida) (1,110,900 visitors; $104,476,500); and Dry Tortugas National Park (Florida) (64,865 visitors; $3,783,600).

The NPS has voiced specific concerns regarding noise impacts of OCS oil- and gas-related activities. The NPS cited White (2014), which provides data on baseline noise levels at Horn and Petit Bois Islands relative to Fort Pickens. Horn and Petit Bois Islands have higher measures of watercraft noise and lower levels of aircraft noise than Fort Pickens. The study also found that Horn and Petit Bois Islands have higher levels of noise at night than during the day, while Fort Pickens has more noise during the day than at night. The study results did not differentiate between OCS oil- and gas-related noise and other anthropogenic noise. The NPS also voiced concerns regarding the night lighting of OCS structures. The NPS provided BOEM with data regarding the overall scales of natural and anthropogenic light at Horn and Petit Bois Island. These data found that the anthropogenic light ratio is 537 percent higher than average natural conditions at Horn Island and 510 percent higher than average natural conditions at Petit Bois Island (Brown, official communication, 2014).

During scoping for recent EISs, the NPS raised questions regarding the potential visual impacts from OCS platforms to Horn and Petit Bois Islands. Horn and Petit Bois Islands are federally designated wilderness areas and are sensitive to disruptions to nature experiences. **Figure 4-2** presents information regarding the current and historical locations of structures in the vicinity of Horn and Petit Bois Islands. Numerous OCS structures and wells have existed within 15 mi (24 km) of the GUIS over the years, many of which have been removed (**Figure 4-2**). Some OCS platforms are visible on the horizon. No studies have analyzed the impacts of the historical OCS structures on visitor experiences. **Figure 4-3** is a photograph of the remaining OCS structures taken from Petit Bois Island. **Figure 4-3** also shows a ship passing through the major shipping fairway near Petit Bois Island; the location of this shipping fairway is shown in **Figure 4-2**. This shipping fairway will continue to be used regardless of the CPA proposed action. In **Figure 4-3**, the platforms are barely visible and have less of an impact on the viewshed than the passing ship.

An analysis of the visual impacts of the CPA proposed action depends importantly on the locations of the structures likely to arise. Given the low resource potential offshore Mississippi, as well the low current prevailing energy prices, it is unlikely that a production structure would arise from the CPA proposed action. In the unlikely event of a lease near Horn or Petit Bois Island, it would probably be developed using minimal structures that tie back to existing platforms due to cost considerations. In addition, BOEM developed the ITL that provides for NPS consultation on a lessee's plans (excerpt from the ITL is below), as appropriate, and began adding the ITL to the Notices of Sale for proposed CPA

lease sales beginning with CPA Lease Sale 231. The lease blocks that would be subject to the Gulf Islands National Seashore's ITL are illustrated in **Figure 4-4**. The ITL states the following:

> (q) Gulf Islands National Seashore. Potential bidders are hereby notified that postlease plans submitted by lessees of whole and partial lease blocks located within the first 12 miles of Federal waters near the Gulf Islands National Seashore (State of Mississippi Barrier Island Chain Map, enclosed with ITL) may be subject to additional review in order to minimize visual impacts from development operations on these blocks. BOEM will review and make decisions on a lessee's plans for these blocks in accordance with applicable Federal law and regulations, and BOEM policies, to determine if visual impacts are expected to cause serious harm and if any additional mitigative action is required. Mitigations may include, but are not limited to, requested changes in location, modifications to design or direction of proposed structures, pursuing joint use of existing structures on neighboring blocks, changes in color design, or other plan modifications. BOEM may consult with the State of Mississippi and/or the State of Alabama and with the National Park Service, Southeast Regional Office, during such reviews as appropriate.

The following whole and partial blocks are specifically identified for this ITL: Chandeleur Area – 1; Mobile – 765-767, 778, 779, 809-823, 853-867, 897-910, 942-954, and 987-997; and Viosca Knoll – 24-27.

BOEM would expect this ITL to be applied to proposed CPA Lease Sale 247. For these reasons, potential impacts to these islands would likely be negligible to minor.

Accidental events that could result from the CPA proposed action will be small, of short duration, and not likely to impact Gulf Coast recreational resources. Should an oil spill occur and contact a beach area or other recreational resource, it will cause some disruption during the impact and cleanup phases of the spill. Beaches, nature parks, and wetland areas could be impacted during these phases of a spill. Disruptions to beaches, nature parks, and wetland areas could also have impacts on firms and consumers that depend on the use of these resources. Media coverage and public perception regarding the extent of the oil damage can also influence the ultimate economic impacts of the spill. The economic impacts of a spill would be mitigated to some extent if a legal damage claims process were to be implemented subsequent to an oil spill. However, all of these effects would likely be small in scale and of short duration. A catastrophic oil spill, however, would likely have larger impacts on recreational resources; these impacts are discussed in **Appendix B**. A catastrophic spill is not part of the CPA proposed action and is not likely expected to occur. This analysis of impacts is based on historical leasing patterns as well as the subsequent review process called for in BOEM's Information to Lessees and Operators regarding the Gulf Islands National Seashore.

Cumulative Impacts

The cumulative analysis considers the effects of impact-producing factors related to OCS oil and gas along with non-OCS oil- and gas-related impacts of other commercial, military, offshore, and coastal activities, and natural processes that may occur and adversely affect recreational resources in the same general area of the CPA proposed action.

The CPA proposed action would contribute to the aesthetic impacts and space-use conflicts that arise due to the broader OCS Program. This includes impacts from vessel traffic, marine debris, and the presence or absence of OCS oil- and gas-related infrastructure. Vessel traffic can cause space-use conflicts with recreational activities such as boating. Marine debris can degrade the recreational value of resources such as beaches. The presence or absence of OCS oil- and gas-related infrastructure could impact activities such as recreational fishing or diving. Oil spills could also contribute to the overall degradation of beach and wetland-based recreational resources. Most accidental spills are not likely to impact Gulf Coast recreational resources because they are expected to be small and of short duration (refer to **Chapter 3.2.1**). If oil resulting from a spill were to contact a beach area or other recreational resource, disruption could occur from oiling and oil cleanup. However, these effects are also likely to be small in scale and of short duration. The impacts of a low-probability catastrophic oil spill, which is not part of the CPA proposed action and not likely expected to occur, on recreational resources are discussed in **Appendix B**.

Recreational resources along the Gulf Coast can also be impacted by non-OCS oil- and gas-related aesthetic and space-use conflicts, as well as a variety of other factors, such as coastal erosion, beach disruptions, and economic factors. However, the incremental contribution of the CPA proposed action is expected to be minimal in light of all OCS oil- and gas-related and non-OCS oil- and gas-related activities. This is because of the small scale of the CPA proposed action, as well as the fact that most impacts to recreational resources will be temporary.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS

BOEM conducted a search of Internet sources and of known data providers for new information regarding recreational resources. BOEM has incorporated a new methodology for defining the scales of recreation and tourism in the Gulf of Mexico that applies data from IMPLAN Group LLC (2015) to the methodologies developed in Nadeau et al. (2014). This methodology allows for more detailed examinations of which industries support recreation and tourism. The use of IMPLAN data allows BOEM to overcome the disclosure issues in certain industries and counties associated with other data sources. Nadeau et al. (2014) defined which industries comprise recreation and tourism, and estimated the percentage of each industry that supports tourism. For example, the hotel industry is primarily supported by tourists, while the restaurant industry is supported by tourists and local residents. **Table 4-2** presents estimates of the employment and value-added supported by recreation and tourism in BOEM's Economic Impact Areas (EIAs). The areas with the largest recreation and tourism industries are TX-3 (which includes Houston and Galveston), LA-6 (which includes New Orleans), and various EIAs along the Florida coast. Parts of coastal Mississippi and Alabama also have sizeable recreational economies supported by parks, beaches, and casinos.

During scoping for this Supplemental EIS, the NPS requested that BOEM emphasize that certain lighting designs can limit light pollution to resources such as Horn and Petit Bois Islands. These lighting designs include utilizing full cut-off lighting fixtures, lighting only the intended task area, using the minimal intensity of light necessary, and using switches, timers, or motion sensors. The NPS provides information regarding the best practices for minimizing light pollution (USDOI, NPS, 2016). The extent to which these lighting designs will be employed for structures arising from the CPA proposed action will depend on safety considerations, operational discretion, and regulatory requirements.

Information found in the Final PDARP/PEIS projected that 17 million user days of boating, fishing, and beach-going experiences were lost due to the *Deepwater Horizon* oil spill, and the NRDA Trustees further projected a public value of lost uses in excess of $600 million (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. In particular, the visual impacts that will arise due to site-specific offshore oil and gas activities are not fully known. Uncertainty remains regarding the impacts of the *Deepwater Horizon* explosion, oil spill, and response on recreational resources. BOEM has determined that such information is not essential to a reasoned choice among alternatives because much of this uncertainty relates to the inherent uncertainty regarding where and what types of structures will arise from the CPA proposed action. In addition, existing information allows for sufficient estimates of the overall dependence of visual impacts to factors such as distance, height, brightness, and general location. BOEM used generally accepted scientific principles to estimate the visual impacts of the CPA proposed action, including literature sources, data sources, and photographic evidence. BOEM has issued an ITL to ensure that visual impacts near the Gulf Islands National Seashore will be addressed at BOEM's site-specific review stage.

Summary and Conclusion

BOEM has reexamined the analysis for recreational resources presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for recreational resources presented in those NEPA documents because the new information was roughly consistent with prior expectations. The analysis and potential impacts detailed and updated in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.22. Archaeological Resources

4.1.1.22.1. Historic Archaeological Resources

BOEM has reexamined the analysis for historic archaeological resources presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for historic archaeological resources presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

Historic archaeological resources on the OCS consist of historic shipwrecks and a single historic lighthouse, the Ship Shoal Light. A historic shipwreck is defined as a submerged or buried vessel or its associated components, at least 50 years old, that has foundered, stranded, or wrecked, and that is currently lying on or embedded in the seafloor. Ships are known to have traversed the waters of the CPA as early as Captain Alonso Alverez de Piñeda's expedition in 1519.

A detailed description of the affected environments and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.22.1 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.22.1 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.22.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. BOEM has found no significant new information that has become available since publication of those NEPA documents.

Impacts of Routine Activities and Accidental Events

Routine impact-producing factors associated with the CPA proposed action that could impact historic archaeological resources include direct physical contact with a shipwreck site; the placement of drilling rigs and production systems on the seafloor; pile driving associated with platform emplacement; dredging of new channels, as well as maintenance dredging of existing channels; anchoring activities; pipeline installation and maintenance; post-decommissioning platform removal and trawling clearance; and the masking from geophysical sensors of archaeological resources from industry-related debris.

The greatest potential impact to an archaeological resource as a result of the CPA proposed action would result from direct contact between an offshore activity (e.g., platform installation, drilling rig emplacement, and dredging or pipeline project) and a historic site because of incomplete knowledge of the location of these sites in the Gulf. The risk of contact to archaeological resources is greater in instances where archaeological survey data are inadequate or unavailable. Such an event could result in the disturbance or destruction of important archaeological information. Archaeological surveys provide the necessary information to develop avoidance strategies that reduce the potential for impacts on archaeological resources.

Damage to archaeological resources from offshore oil and gas activity can be minimized by conducting archaeological surveys before seabed disturbance occurs. Archaeological surveys, where required prior to an operator beginning OCS oil- and gas-related activities on a lease, are expected to be effective at identifying possible archaeological sites. The technical requirements of the archaeological resource reports are detailed in NTL 2005-G07, "Archaeological Resource Surveys and Reports." Under 30 CFR § 550.194(c) lessees are required to immediately halt operations and notify BOEM's Regional Director of the discovery of any potential archaeological resources. Under 30 CFR § 250.194(c) and 30 CFR § 250.1010(c), lessees are also required to immediately halt operations and notify BSEE's Regional Director of the discovery of any potential archaeological resources.

Except for the projection of up to one new gas processing facility and up to one new pipeline landfall, the CPA proposed action would require no new oil and gas coastal infrastructure. It is expected that archaeological resources would be protected through the review and approval processes of the various Federal, State, and local agencies involved in permitting onshore activities.

Impacts to documented and undocumented historic archaeological resources could occur as a result of an accidental oil spill and the associated cleanup operations. Detailed risk analyses of offshore oil spills ranging from <1,000 bbl to ≥1,000 bbl and coastal spills associated with the CPA proposed action are provided in **Chapters 3.2.1.5, 3.2.1.6, and 3.2.1.7**. When oil is spilled in offshore areas, much of the oil volatilizes or is dispersed by currents, so it has a low probability of contacting coastal areas. However, should a spill contact a historic archaeological site (including submerged sites), damage might include contamination of materials, direct impact from oil-spill cleanup equipment, and/or looting. An additional major effect from an oil spill could be viewshed pollution of a historic coastal site, such as a fort or lighthouse. Although such effects may be temporary and reversible, cleaning oil from historic structures can be a complex, time-consuming, and expensive process, and the use of dispersants may result in long-term chemical contamination of submerged cultural heritage sites (e.g., Chin and Church, 2010). As of the publication of this Supplemental EIS, there are no published studies documenting or analyzing the long-term effects of oil or dispersant contamination on submerged archaeological sites. It is expected, however, that any spill cleanup operations would be considered a Federal undertaking for the purposes of Section 106 of the National Historic Preservation Act (54 U.S.C. § 300101 *et seq.*) and would be conducted in such a way as to minimize impacts to historic archaeological resources.

Cumulative Impacts

Several OCS oil- and gas-related cumulative impact-producing factors could potentially impact historic archaeological resources, including the following: (1) OCS Program routine and accidental impacts; (2) artificial rigs-to-reefs development; and (3) renewable energy and alternative use conversions. Historic archaeological resources on the OCS are vulnerable to OCS oil- and gas-related cumulative impact-producing factors due to the associated bottom-disturbing activities. An impact could result from direct physical contact between historic shipwrecks located on the OCS and OCS Program oil and gas activities (i.e., pipeline and platform installations, drilling rig emplacement and operation, site decommissioning, rigs-to-reefs development, dredging, and anchoring activities). Permitting OCS oil- and gas-related development prior to requiring archaeological surveys has been documented to have impacted wrecks containing significant or unique historic information. Impacts may be reduced when preconstruction surveys are required by BOEM or the permitting agency prior to these activities. Impacts to historic resources may still occur in areas where a remote-sensing survey fails to resolve the location of partially or completely buried resources or when no pre-disturbance survey is required. Impacts to documented and undocumented historic archaeological resources could occur as a result of an accidental oil spill and the associated cleanup operations; however, the potential for spills is low, the effects would generally be localized, and the cleanup efforts would be regulated. Low-probability catastrophic spills, which are not part of the CPA proposed action and not likely expected to occur, are discussed in **Appendix B**.

Non-OCS oil- and gas-related cumulative impact-producing factors that could potentially impact historic archaeological resources include the following: (1) State oil and gas activity; (2) offshore LNG projects; (3) new channel dredging and maintenance dredging; (4) State renewable energy and alternative use conversions; (5) State artificial reefs and rigs-to-reefs development; (6) commercial fishing; (7) sport diving and commercial treasure hunting; and (8) natural processes, including wave action and hurricanes. As with the OCS oil- and gas-related cumulative impact-producing factors, risks from the above non-OCS oil- and gas-related cumulative impact-producing factors are related to their associated bottom-disturbing activities. An impact could result from direct physical contact between historic shipwrecks and State-related oil and gas activities, sand borrowing, renewable energy activities, LNG facility construction, artificial reef creation, new channel dredging, and maintenance dredging. With the exception of maintenance-dredging, preconstruction surveys may be required for these activities. Impacts to historic archaeological resources may still occur in areas where a remote-sensing survey fails to resolve the location of partially or completely buried resources or when no pre-disturbance survey is required.

The effects of the various impact-producing factors discussed in this analysis have likely resulted in the localized loss of significant or unique historic archaeological information. In the case of factors

related to OCS Program activities within the cumulative activity area, it is reasonable to assume that most impacts would have occurred where development occurred prior to any archaeological survey requirements. The incremental contribution of the CPA proposed action is expected to be very small due to the efficacy of remote-sensing surveys and archaeological reports where required. Future OCS Program activities and the bottom-disturbing activities permitted by BOEM and other agencies may require preconstruction archaeological surveys that, when completed, are highly effective in identifying bottom anomalies that could be avoided or investigated before bottom-disturbing activities begin. When surveys are not required, it is impossible to anticipate what might be embedded in or lying directly on the seafloor, and impacts to these sites are likely to be major in scale. Despite diligence in site-clearance survey reviews, there is still the possibility of an unanticipated interaction between bottom-disturbing activity (e.g., rig emplacement, pipeline trenching, anchoring, and other ancillary activities) and a historic shipwreck.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

Various Internet sources were examined to assess recent information regarding impacts to archaeological resources or potential new threats to archaeological resources that may be pertinent to the CPA. These Internet sources included online indexes to periodical literature, such as JSTOR, the National Technical Information Service's National Technical Reports Library, and ScienceDirect. This search did not identify any new information that would be pertinent to the analysis of the potential impacts of OCS oil- and gas-related activities on historic archaeological resources.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the conclusions from the prior 2012-2017 Gulf of Mexico EISs are still valid. No new significant information has been identified since those NEPA documents were published that would alter those documents' conclusions on impacts to historic archaeological resources from the CPA proposed action. Nevertheless, there is still incomplete or unavailable information regarding the long-term effects of oil and/or dispersant contamination on, and the location of, historic archaeological resources in the CPA. As discussed above, there are currently no published studies on the long-term effects to historic archaeological resources exposed to oil or dispersant contamination. Such information is unlikely to be available prior to proposed CPA Lease Sale 247; therefore, considering the low probability of an accidental oil spill contacting an archaeological site as a result of the CPA proposed action, BOEM has determined that the incomplete or unavailable information is not essential to a reasoned choice among alternatives.

Additionally, the locations of historic archaeological resources in the CPA cannot be determined because the overall costs of obtaining that information through survey of the entire CPA are exorbitant. This incomplete information may be relevant to adverse effects because the locations and integrity of many historic archaeological resources remain unknown. Nevertheless, this incomplete information is not likely to be available within the timeline contemplated in the NEPA analysis of this Supplemental EIS. It would take several years before data confirming the presence (or lack thereof) of historic archaeological resources, and the status of each, could be investigated, analyzed, and compiled. Historic archaeological sites within the CPA region have the potential to be buried, embedded in, or laying on the seafloor. The CPA covers an area of 66,446,351 ac and ranges in water depths from an estimated 3 to 3,475 m (10 to 11,401 ft). It includes highly variable bathymetric and geophysical regimes, which differentially affect the ease and ability to identify, verify, and evaluate historic archaeological sites. This fact, combined with the scope of the acreage within the CPA, results in the aforementioned exorbitant costs and time factors.

BOEM used reasonably accepted scientific theories on archaeological site potential in the Gulf of Mexico to extrapolate from existing survey data in completing the relevant analysis and formulating the conclusions presented here. In addition, site-specific, remote-sensing surveys of the seafloor will be required when deemed appropriate to establish the presence of potential resources (NTL 2005-G07). The results of these surveys are reviewed in tandem with credible scientific evidence from previously identified sites, regional sedimentology, and physical oceanography that is relevant to evaluating the

adverse impacts on historic resources that are a part of the human environment. The required surveys are analyzed by industry and BOEM archaeologists prior to the authorization of any new or significant bottom-disturbing impacts and, if necessary, avoidance of potential archaeological resources is prescribed. Archaeological surveys are expected to be highly effective in identifying resources to allow for the protection of the resource during OCS oil- and gas-related activities. The CPA proposed action is not expected to have a reasonably foreseeable significant impact because BOEM's evaluation of such impacts is based upon pre-disturbance and site-specific surveys, the results of which BOEM uses to require substantial avoidance of any potential historic resource that could be impacted by the CPA proposed action. Therefore, BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for historic archaeological resources presented in the prior 2012-2017 Gulf of Mexico EISs. No new significant information was discovered that would alter the impact conclusion for historic archaeological resources presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.22.2. Prehistoric Archaeological Resources

BOEM has reexamined the analysis for prehistoric archaeological resources presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for prehistoric archaeological resources presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

Prehistoric archaeological resources are any material remains of human life or activities associated with the earliest inhabitants of the Gulf Coast, predating European discovery and exploration of the area. Available evidence suggests that the first Americans arrived on the Gulf Coast as much as 12,000 years B.P. (before present) during a time when the continental shelf was exposed above sea level and open to habitation (Pearson et al., 1986). Prehistoric archaeological sites are thought to be preserved shoreward of the 45-m (148-ft) bathymetric contour, where the Gulf of Mexico continental shelf was subaerially exposed during the Late Pleistocene.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.22.2 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.22.2 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.22.2 of the CPA 235/241/247 Supplemental EIS and CPA 2341/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. BOEM has found no significant new information that has become available since publication of those documents.

Impacts of Routine Activities and Accidental Events

Routine impact-producing factors associated with the CPA proposed action that could impact prehistoric archaeological resources include direct physical contact associated with the placement of drilling rigs and production systems on the seafloor; pile driving associated with platform emplacement; dredging of new channels, as well as maintenance dredging of existing channels; anchoring activities; pipeline installation and maintenance; and post-decommissioning platform removal and trawling clearance. This direct physical contact with a site could destroy fragile artifacts or site features and could disturb artifact provenance and site stratigraphy. The result would be the loss of archaeological data on prehistoric migrations, settlement patterns, subsistence strategies, and archaeological contexts for North America, Central America, South America, and the Caribbean.

Archaeological survey and archaeological clearance of sites, where required prior to an operator beginning oil and gas activities on a lease, are expected to be somewhat effective at identifying submerged landforms that could support archaeological sites. While surveys, where required, provide a

reduction in the potential for a damaging interaction between an impact-producing factor and a prehistoric archaeological site, there is a possibility of an OCS oil- and gas-related activity contacting an archaeological site because of an insufficiently dense survey grid. Should such contact occur, there would be damage to or loss of significant and/unique archaeological information. The risk of contact to archaeological resources is greater in instances where archaeological survey data are inadequate or unavailable. Archaeological surveys provide the necessary information to develop avoidance strategies that reduce the potential for impacts on archaeological resources.

Except for the projection of up to one new gas processing facility and up to one new pipeline landfall, the CPA proposed action would require no new oil and gas coastal infrastructure. It is expected that the protection of archaeological resources would be maximized through the review and approval processes of the various Federal, State, and local agencies involved in permitting onshore activities.

Impacts to documented and undocumented prehistoric archaeological resources could occur as a result of an accidental oil spill and the associated cleanup operations. Oil spills resulting from a loss of well control in the CPA and related spill-response activities have the potential to impact cultural resources near the spill site and landfall areas. Detailed risk analyses of offshore oil spills ranging from <1,000 bbl to ≥1,000 bbl and coastal spills that may be associated with the CPA proposed action is provided in **Chapters 3.2.1.5, 3.2.1.6, and 3.2.1.7** of this Supplemental EIS and Chapters 3.2.1.5, 3.2.1.6, and 3.2.1.7 of the 2012-2017 WPA/CPA Multisale EIS. Should a spill contact a prehistoric archaeological site, damage might include loss of radiocarbon-dating potential, direct impact from oil-spill cleanup equipment, and/or looting. There is currently no published information documenting or analyzing the long-term effects of oil or dispersant contamination on prehistoric archaeological sites. Previously unrecorded sites could be impacted by oil-spill cleanup operations on beaches. However, when oil is spilled in offshore areas, much of the oil volatilizes or is dispersed by currents, so it has a low probability of contacting coastal and barrier island prehistoric sites as a result of the CPA proposed action. The CPA proposed action, therefore, is not expected to result in impacts to prehistoric archaeological sites due to an accidental oil spill.

Cumulative Impacts

The OCS oil- and gas-related activities that could potentially impact prehistoric archaeological sites located on the OCS through contact include pipeline and platform installations, drilling rig emplacement and operation, site decommissioning, rigs-to-reefs development, dredging, and anchoring activities. Preconstruction surveys may be required by BOEM or the lead permitting agency prior to these activities. Impacts to prehistoric resources may still occur in areas where a remote-sensing survey fails to resolve the location of partially or completely buried resources or when no pre-disturbance survey is required. Development onshore as a result of the CPA proposed action could result in the direct physical contact between a prehistoric site and pipeline trenching. It is assumed that archaeological investigations prior to construction will serve to mitigate these potential impacts. Oil spills have the potential to impact coastal prehistoric sites directly or indirectly by physical impacts caused by oil-spill cleanup operations. The number and most likely spill sizes to occur in coastal waters in the future are expected to resemble the patterns that have occurred in the past, as long as the level of oil- and gas-related commercial and recreational activities remain the same. Low-probability catastrophic spills, which are not part of the proposed action and not likely expected to occur, could also contact coastal prehistoric sites, and the effects of a spill that size would likely result in longer-lasting impacts that take longer to mitigate. Accidental spills as a result of a low-probability, catastrophic spill are discussed in **Appendix B**.

Non-OCS oil- and gas-related cumulative impact-producing factors that could potentially impact prehistoric archaeological resources including the following: (1) State oil and gas activity; (2) new channel dredging and maintenance dredging; (3) State renewable energy and alternative use conversions; (4) State artificial reefs and rigs-to-reefs development; (5) OCS sand borrowing; (6) offshore LNG projects; (7) commercial fishing; and (8) natural processes, including wave action and hurricanes. These impact-producing factors all create associated bottom disturbances that may threaten prehistoric archaeological resources. An impact could result from contact between prehistoric resources and permitted activities such as State oil and gas activities, renewable energy activities, artificial reef creation, new channel dredging, and maintenance dredging. With the exception of maintenance dredging, preconstruction surveys may be required for these activities. Impacts to prehistoric resources may still occur in areas where a remote-sensing survey fails to resolve the location of partially or completely buried

resources or when no pre-disturbance survey is required. Oil and gas program wells, structures, and pipelines existing entirely in State waters are not under the jurisdiction of BOEM with respect to the archaeological resource protection requirements of the National Historic Preservation Act and would be the responsibility of the State and the permitting Federal agency. Prehistoric sites in shallow waters and on coastal beaches are exposed to the destructive effects of wave action and scouring currents. Overall, loss of data from prehistoric sites has probably occurred, and will continue to occur, in the northeastern Gulf of Mexico from the effects of tropical storms.

The effects of the various impact-producing factors discussed in this cumulative analysis have likely resulted in localized losses of significant or unique prehistoric archaeological information. In the case of factors related to OCS Program activities in the cumulative activity area, it is reasonable to assume that most impacts have occurred in areas where surveys have not been required in the past or have been acquired at insufficient transect spacing. The incremental contribution of the CPA proposed action is expected to be very small due to the efficacy of the required remote-sensing survey and concomitant archaeological report and clearance.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

Various Internet sources were examined to assess recent information regarding impacts to archaeological resources or potential new threats to archaeological resources that may be pertinent to the CPA. These Internet sources included various online indexes to periodical literature such as JSTOR, the National Technical Information Service's National Technical Reports Library, and ScienceDirect.

This search did not identify any new information that would be pertinent to the analysis of the potential impacts of OCS oil- and gas-related activities on prehistoric archaeological resources.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the conclusions from the prior 2012-2017 Gulf of Mexico EISs are still valid because no new information on prehistoric archaeological resources from the CPA proposed action has become available since those documents were published; nevertheless, there is still incomplete or unavailable information regarding the long-term effects of oil and/or dispersant contamination on, and the location of, prehistoric archaeological resources in the CPA.

This incomplete information may be relevant to adverse effects because the locations and integrity of prehistoric archaeological resources on the OCS remain unknown. Nevertheless, this incomplete information is not likely to be available within the timeline contemplated within the NEPA analysis of this Supplemental EIS. It would take many years before data confirming the presence of prehistoric archaeological resources in a given location, and the status of each, could be investigated, analyzed, and compiled. Most prehistoric sites within the CPA region are likely deeply buried, resulting in the largest portion of the aforementioned exorbitant costs and time factors. An extensive study funded by the National Park Service in 1977 in the CPA estimated that prehistoric period sites could be buried on the OCS under as much as 200 m (656 ft) of sediment in western portions of the CPA and 107 m (351 ft) of sediment in eastern portions of the CPA (Coastal Environments, Inc., 1977).

BOEM used reasonably accepted scientific methodologies to extrapolate from existing survey data in completing the relevant analysis and formulating the conclusions presented here. In addition, new site-specific, remote-sensing surveys of the seafloor are required when deemed appropriate to establish the presence of potential resources. The results of these surveys are reviewed in tandem with credible scientific evidence from previously identified terrestrial sites, regional sedimentology, and physical oceanography that is relevant to evaluating the adverse impacts on landforms that may preserve prehistoric resources that are a part of the human environment. The required surveys are analyzed by archaeologists prior to any new or significant bottom-disturbing impacts being authorized and avoidance of potential resources prescribed. Archaeological surveys, where required, are expected to be highly effective in identifying resources to allow for the protection of the resource during OCS oil- and gas-related activities. The CPA proposed action is not expected to have a reasonably foreseeable significant impact because BOEM's evaluation of such impacts is based upon pre-disturbance and site-specific

survey, the results of which BOEM uses to require substantial avoidance of any potential prehistoric resource that could be impacted by the proposed activity. Therefore, BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for prehistoric archaeological resources presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for prehistoric archaeological resources presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.23. Human Resources and Land Use

4.1.1.23.1. Land Use and Coastal Infrastructure

BOEM has reexamined the analysis for land use and coastal infrastructure presented in the prior 2012-2017 Gulf of Mexico EISs, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for land use and coastal infrastructure presented in those NEPA documents. The analysis and potential impacts detailed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affect environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.23.1 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.23.1 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.23.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

Routine impact-producing factors associated with the CPA proposed action that could affect land use and coastal infrastructure include the construction of new or expansion of existing gas processing facilities, pipeline landfalls, service bases, navigation channels, and waste disposal facilities. The OCS oil- and gas-related infrastructure has developed over many decades and is an extensive and mature system that provides support for offshore activities. The expansive presence of this coastal infrastructure is the result of long-term industry trends, and it is not subject to rapid fluctuations.

Routine activities relating to the CPA proposed action are expected to minimally affect the current land use of the analysis area because most subareas have strong industrial bases and designated industrial parks with existing infrastructure and facilities to accommodate future growth in oil and gas businesses. BOEM projects up to one new gas processing facility and up to one new pipeline landfall may occur from activities associated with the CPA proposed action. There may be increased demand for waste disposal services; however, this would minimally affect land use and infrastructure because waste disposal would occur at facilities already designated for such purposes and enough spare capacity exists at these facilities in the GOM region (Dismukes, official communication, 2015). BOEM anticipates that there may be maintenance dredging of navigation channels in support of routine activity at services bases as a result of the CPA proposed action.

Accidental events associated with the CPA proposed action that could affect land use and coastal infrastructure include, but are not limited to, oil spills, vessel collisions, and chemical/drilling-fluid spills. Accidental events associated with the CPA proposed action would occur at differing levels of severity, based in part on the location, timing/season, and size of event. Depending on where an accidental event occurs, it is expected that the oil-spill response equipment needed to respond to an offshore spill as a result of the proposed CPA lease sale could be called out from one or more of the following oil-spill equipment base locations: New Iberia, Belle Chasse, Baton Rouge, Sulphur, Morgan City, Port Fourchon, Harvey, Leeville, Fort Jackson, Venice, Grand Isle, or Lake Charles, Louisiana; La Porte,

Corpus Christi, Port Arthur, Aransas Pass, Ingleside, Galveston, or Houston, Texas; Kiln or Pascagoula, Mississippi; Mobile or Bayou La Batre, Alabama; Panama City, Pensacola, Tampa, or Miami, Florida; and/or Ponce or San Juan, Puerto Rico (Clean Gulf Associates, 2014; Marine Spill Response Corporation, 2014; National Response Corporation, 2014).

Cumulative Impacts

The cumulative analysis considers both existing land use patterns and the effects of impact-producing factors from OCS oil- and gas-related and non-OCS oil- and gas-related activities. Impact-producing factors associated with OCS oil- and gas-related activities that could affect land use and coastal infrastructure include the construction of new or expansion of existing gas processing facilities, pipeline landfalls, service bases, navigation channels, and waste disposal facilities, plus the occurrence of oil spills, vessel collisions, and chemical/drilling-fluid spills. Any service base expansion in the cumulative case would be limited, would occur on lands designated for such purposes, and would have minimal effects on land use and infrastructure. Impacts resulting from chemical or oil spills and vessel collisions can vary in location and severity, but they are not likely to last long enough to adversely affect overall land use or coastal infrastructure in the analysis area. A low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, can result in impacts to land use and coastal infrastructure. For more information on a low-probability catastrophic spill event, refer to **Appendix B**. Therefore, the incremental contribution of impact-producing factors from cumulative OCS oil- and gas-related activities to the cumulative impacts on land use and coastal infrastructure is also expected to be minor.

The non-OCS oil- and gas-related factors that can contribute substantially to the baseline conditions as well as affect coastal infrastructure and land use consist of the following:

- prior, current, and future State oil and gas lease sales;
- other onshore fossil fuel exploration and production activities;
- petrochemical and manufacturing activities;
- housing and other residential developments;
- the development of private and publicly owned recreational facilities;
- the construction and maintenance of industrial facilities and transportation systems;
- urbanization;
- city planning and zoning;
- changes to public facilities such as water, sewer, educational, and health facilities;
- changes to military bases and reserves;
- changes in population density;
- changes in State and Federal land use regulations;
- changes in non-OCS oil- and gas-related demands for water transportation systems and ports;
- macro- and microeconomic trends;
- coastal landloss and subsidence; and
- natural processes.

The OCS oil and gas program exists within a highly industrialized and economically diverse coastal region, which is itself the aggregate of past and present community, government, and business actions. How land has been traditionally used or will be used in the future is determined irrespective of the CPA proposed action. Coastal infrastructure associated with the OCS oil and gas industry is also utilized by

State leased and privately owned oil and gas interests, as well as other industries. State oil and gas activities and associated impacts will occur based on State leasing programs, geologic plays, economic trends, and local regulatory regimes. The OCS oil- and gas-related support activities occur within a context of a well-established populated coastal region, which is home to a diverse and robust economy. Many local and national industries, such as agricultural and industrial interests, utilize the same transportation systems and ports used by the OCS oil and gas industry. The OCS oil- and gas-related demands on land use are typically relegated to coastal or inland waterway industrial zones and represent a small fraction of how existing residential, recreational, agricultural, military, and industrial uses utilize and impact land use and coastal infrastructure. Because the vast majority of coastal infrastructure supports OCS and State offshore and land-based oil and gas production, as well as other land-based industrial uses, the coastal infrastructure supporting the CPA proposed action represents only a small portion of the coastal land use and infrastructure throughout the CPA and Gulf of Mexico. Therefore, the incremental contribution of the CPA proposed action is expected to have minimal impact overall.

Land use categories are tied to existing infrastructure and historic uses, and for the purpose of this analysis include the Economic Research Service's land use inventory categories, which include the following: land-based oil and gas activities and those in State waters; agriculture; forest, parks, and special use areas; urban areas; miscellaneous areas; and inland navigable waterways and ports. Land use patterns vary greatly by region, reflecting differences in soils, climate, topography, and patterns of population settlement. Changes in land use will largely depend upon local zoning and economic trends. Of the over 400,000 mi^2 (1,035,995 km^2) comprising these coastal states, 18 percent of the total land area is covered in cropland. Texas and Mississippi have the highest percentages of cropland, with 20 percent and 19 percent of each respective State's total land being used for cropland. Louisiana's highway network is the 32nd largest in the Nation, with the State highway system the 11th largest. The network is comprised of over 60,000 mi (96,561 km) and more than 13,000 bridges under the jurisdiction of Federal, State, and local governments and entities. The 27.4 percent of highway network centerline mileage that are State-owned places Louisiana 10th nationally, while the 30 percent of total highway network lane mileage that are State-owned places Louisiana 11th (State of Louisiana, Dept. of Transportation and Development, 2011). Five interstate highways converge in Alabama, allowing goods to be shipped to major markets. The I-22 is planned to be completed by 2014, making this the sixth interstate in Alabama (Economic Development Partnership of Alabama, 2013).

The Ports of South Louisiana and Houston rank 13th and 14th, respectively, in total trade for all world ports and 1st and 2nd, respectively, for American ports (American Association of Port Authorities, 2012). With direct access to the Mississippi River and its system of inland rivers, the Port of South Louisiana averages 223 million metric tons per year. In Louisiana, there are 2,823 mi (4,543 km) of inland waterways (State of Louisiana, Dept. of Transportation and Development, 2011). Alabama's water corridors connect to over 15,000 mi (24,140 km) of inland waterways in 23 states (Economic Development Partnership of Alabama, 2013). Meanwhile, OCS oil- and gas-related coastal infrastructure and land use represent only an incremental contribution to total land use, and the cumulative impacts as a result of the CPA proposed action and the OCS Program as a whole on land use and coastal infrastructure are also expected to be minor. This short summary of land uses and land use categories and coastal infrastructure is by no means comprehensive, but it should illustrate that OCS oil- and gas-related coastal land use and infrastructure comprises only a percentage of the total land use and allows us a bird's eye view of the program within the context of other impact-producing factors.

The proposed CPA lease sale would mostly maintain ongoing activity levels associated with the current OCS Program. Industry would essentially maintain its current usage of infrastructure according to the proposed lease sale schedule. Macroeconomic shifts, such as a change in commodity prices or an economic upturn or downturn, will also determine future utilization of this infrastructure.

The CPA proposed action would minimally affect the current land use within the analysis area because most subareas have strong industrial bases and designated industrial parks with enough capacity to accommodate the future growth that OCS oil- and gas-related businesses would demand. Coastal land use and infrastructure along the Gulf Coast can also be impacted by non-OCS oil- and gas-related conflicts, as well as a variety of other factors, such as coastal erosion and economic factors. However, the incremental contribution of the CPA proposed action is expected to be minimal in light of all OCS oil- and gas-related and non-OCS oil- and gas-related activities.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

Additional research was conducted to investigate the availability of recent information affecting land use and coastal infrastructure since publication of the prior 2012-2017 Gulf of Mexico EISs. Various Internet sources were examined, including the websites of numerous Federal and State agencies (USDHS, Federal Emergency Management Agency; USDOC, Bureau of the Census; USDOC, NOAA; U.S. Department of Energy, Energy Information Administration; U.S. Department of Transportation, Maritime Administration; USDOI, FWS; RestoreTheGulf.gov website; *Deepwater Horizon* Oil Spill Portal; USEPA; Louisiana Department of Environmental Quality; Louisiana Recovery Authority; Louisiana Office of Community Development; Mississippi Department of Environmental Quality; Alabama Department of Environmental Management; and the State of Florida Department of Environmental Protection). Further information was sought from other organizations, recently published journal articles, and trade publications such as The Greater Lafourche Port Commission, LA1 Coalition, The Oil Drum, Rigzone, *Oil and Gas Journal*, *Offshore* Magazine, Reuters, TOLLROADS News, and *The Energy Journal*.

The latest projections from the USDOE's Energy Information Administration (2015h) reflect the ongoing trend of decreasing energy imports as domestic production of crude oil and natural gas are projected to continue increasing over the next several years. These projections stand in stark contrast to the ongoing reduction in new rig orders globally and a declining operating rig count in the GOM (Odell, 2015; Offshore, 2015). Fluctuations in new and ongoing OCS oil- and gas-related activities can be expected and will have a minor effect on coastal infrastructure as oil and gas companies adjust to maximize efficiencies and protect profit margins. However, none of this new information would alter the impact conclusion for land use and coastal infrastructure presented in the prior 2012-2017 Gulf of Mexico EISs because the new information is consistent with longstanding expectations. The analysis and potential impacts discussed in those NEPA documents still apply for proposed CPA Lease Sale 247.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in this Supplemental EIS and in Chapter 4.2.1.23.1 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.23.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, BOEM has identified incomplete information regarding the potential impacts of coastal landloss on land use and coastal infrastructure. This incomplete information may be relevant to adverse effects because a comprehensive understanding of the potential impacts of coastal landloss on coastal infrastructure and land use remains unknown. It is not completely known how current subsidence and erosion are affecting industry or whether industry is making plans to mitigate current or future impacts. This information cannot reasonably be obtained because the overall costs in time and money to collect data on the varying impacts of coastal landloss to different firms are exorbitant. BOEM has proposed a study to evaluate these potential effects by surveying industry on current impacts and potential adaptation strategies, but at the time of publication of this Supplemental EIS, it is unfunded, and it would take several years before data could be available. Nevertheless, this incomplete information is not likely to be available within the timeline contemplated in the NEPA analysis of this Supplemental EIS.

BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions presented here. For example, BOEM knows that, in the case of coastal ports for instance, dredged material from navigation slips are used to fill in property and mitigation habitat areas for wildlife and to act as a barrier to protect ports from storm surges (Volz, 2013). While coastal infrastructure is subject to the impacts of coastal landloss and routine tropical storm activity, there is still considerable investment to expand, improve, and protect existing infrastructure. In June 2013, Louisiana Governor Bobby Jindal signed Senate Bill 122, which modified the Investor Tax Credit and the Import-Export Tax Credit. The new credits now include projects like warehousing and storage, port operations, marine cargo handling, ship building and repairs, and oil- and gas-related activities (State of Louisiana, Office of the Governor, 2013). Additionally, the decision

criteria for the State of Louisiana's 5-year coastal restoration planning document places a higher value on collections of risk reduction and restoration projects that improve coastal conditions for oil- and gas-related infrastructure and increase the resilience of coastal communities that support the industry. The criterion also puts a higher value on projects that benefit the navigation industry and places a lower value on projects that impede navigation (State of Louisiana, Coastal Protection and Restoration Authority, 2012a). Therefore, coastal restoration efforts will be focused on those land use areas with a higher concentration of OCS coastal infrastructure. While not completely known, current and future industry adaptation plans for coastal landloss are not essential to a reasoned choice among alternatives for this Supplemental EIS (including the No Action and an Action alternative).

Like any industrial infrastructure improvements, future adaptations will likely occur on an as-needed basis or as new technologies become available. Therefore, BOEM has determined that the information is not essential to a reasoned choice among alternatives. BOEM will continue to monitor industry and its infrastructure footprint over time to document short- and long-term impacts of continued landloss. For a more detailed discussion on deltaic landloss, refer to **Chapter 4.1.1.4**.

Summary and Conclusion

BOEM has reexamined the analysis for land use and coastal infrastructure presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for land use and coastal infrastructure presented in those NEPA documents because the new information was roughly consistent with prior expectations. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.23.2. Demographics

BOEM has reexamined the analysis for demographics presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for demographics presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected and the full analyses of the potential impacts of routine activities, accidental events, and cumulative events associated with the CPA proposed action are presented in Chapter 4.2.1.23.2 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.23.2 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.23.2 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis presented in those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

In general, impact-producing factors that cause employment impacts, such as exploration and delineation activities, development and production activities, and coastal infrastructure development, can have some impacts on the demographic characteristics of a particular area. However, routine activities associated with the CPA proposed action are projected to minimally affect the demography of the analysis area. The projected impacts to population arising from the proposed CPA lease sale are calculated by multiplying the employment estimates from the mathematical model MAG-PLAN by an estimate of the number of members in a typical family. The projected population increases arising from the proposed CPA lease sale are then divided by the population forecasts in Woods and Poole, Inc. (2015), which yields the percentage impacts to population of the proposed CPA lease sale. Population impacts from the CPA proposed action are projected to be minimal (<1% of the total population) for all Economic Impact Areas (EIAs) in the Gulf of Mexico region.

Accidental events associated with the CPA proposed action, such as low- to moderate-scale oil or chemical spills and vessel collisions, would likely have no effects on the long-term demographic characteristics of the Gulf coastal communities. This is because accidental events typically cause only

short-term population movements as individuals seek employment related to the event or have their existing employment displaced during the event.

Cumulative Impacts

The cumulative analysis considers the effects of impact-producing factors related to OCS oil- and gas-related activities along with non-OCS oil- and gas-related impact-producing factors. The OCS oil- and gas-related factors that could impact the demographics of any area consist of routine activities and accidental events arising from prior, current, and future OCS lease sales, including impact-producing factors that cause employment impacts (i.e., exploration and delineation activities, development and production activities, and coastal infrastructure development) as well as oil spills and vessel collisions. The impacts to population arising from the CPA proposed action are projected to be minimal (<1% of the total population) for any EIA in the Gulf of Mexico region based on the employment estimates from the mathematical model MAG-PLAN for low-case and high-case scenarios for OCS oil- and gas-related activities. Accidental events should not have long-term effects on the demographic characteristics of the Gulf coastal communities because population movements from such events are typically short-term. For a detailed discussion of the employment and demographic impacts of a low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, refer to **Appendix B**.

There are numerous non-OCS oil- and gas-related factors that could impact demographics, including fluctuations in workforce, net migration, relative income, oil and gas activity in State waters, offshore LNG activity, trends in tourism activities (refer to **Chapter 4.1.1.21**), and other economic factors (refer to **Chapter 4.1.1.23.3**). Common approaches in analyzing cumulative effects begin by assembling a list of other projects and actions that will likely be associated with the CPA proposed action. However, no such list of future projects and actions could be assembled that would be sufficiently current and comprehensive to support a cumulative analysis for all 133 of the coastal counties and parishes in the analysis area over a 40-year period. Instead, this analysis uses the economic and demographic projections from Woods & Poole Economics, Inc. (2015) as a reasonable approximation to define the contributions of other likely projects, actions, and trends to the cumulative case.

The CPA proposed action would contribute to the population impacts arising from the overall OCS Program. The CPA proposed action is projected to have an incremental contribution of less than 1 percent to the population level in any of the EIAs, in comparison with other factors influencing population growth, such as the status of the overall economy, fluctuations in workforce, net migration, health trends, and changes in income. Given both the low levels of population growth and industrial expansion associated with the CPA proposed action, it is expected that the baseline age and racial distribution patterns will continue through the analysis period.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

BOEM conducted a search of Internet resources and known data sources related to demographics. The primary source of new information is Woods & Poole Economics, Inc. (2015), which is an annual update of the data that were used in the CPA 241/247 Supplemental EIS. Woods & Poole Economics, Inc. (2015) provides projections of economic and demographic variables at the county/parish level. In **Chapter 4.1.1.23.3**, BOEM introduced new EIAs that aggregate counties based on trade, commuting, and demographic data. **Table 4-3** aggregates Woods and Poole data by EIA and presents each EIA's population, employment, gross regional product, income per capita, median age, male percentage, and race composition. The largest EIAs (in terms of population and employment) are TX-3 (which includes Houston and Galveston), FL-5 (which includes Tampa), and TX-1 (which includes Cameron and Hidalgo Counties). The smallest EIAs are TX-6, MS-2, and LA-2. **Table 4-4** presents Woods and Poole's forecasted levels of economic and demographic variables in 2050. From 2015 through 2050, the fastest population and employment growth is forecast in TX-1, TX-3, FL-6, and FL-4; the slowest growth is forecast in LA-6, TX-5, AL-2, and MS-1.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change impact conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. This incomplete or unavailable information relates to translating employment impacts of OCS oil- and gas-related activities into estimated population impacts. This information cannot be obtained at this time due to data limitations and the complexity of methodologies needed to accurately estimate population impacts arising from OCS oil- and gas-related activities. BOEM plans to initiate a study project to analyze population impacts more fully, although this potential study project will not be completed within the timeline contemplated in the NEPA analysis of this Supplemental EIS. BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing this analysis and formulating the conclusions here. For example, BOEM used data from Woods & Poole Economics, Inc. (2015), which provides projections of the evolution of the total population in all EIAs in future years. These projections assume the continuation of existing social, economic, and technological trends at the time of the forecast. This incomplete or unavailable information is unlikely to significantly impact BOEM's estimates of the impacts of OCS lease sales on demographics, in part because these impacts are fairly limited. In addition, increases in population arising from lease sales are generally positive, not adverse, impacts. Therefore, BOEM has determined that the incomplete or unavailable information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for demographics presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for demographics presented in those NEPA documents because the new Woods and Poole Economics, Inc. data did not change much from what was presented in those documents. The analysis and potential impacts in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.23.3. Economic Factors

BOEM has reexamined the analysis for economic factors presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for economic factors presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts on economic factors from routine activities, accidental events, and cumulative events associated with the CPA proposed action are presented in Chapter 4.2.1.23.3 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.23.3 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.23.3 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EISs. The following is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

Impacts of Routine Activities and Accidental Events

Impact-producing factors such as exploration and delineation activities, development and production activities, and coastal infrastructure development can have some impacts on the economic characteristics, such as employment, of a particular area. The expected economic impacts of the OCS oil and gas industry are estimated using the mathematical model MAG-PLAN. The MAG-PLAN estimates the direct, indirect, and induced employment arising from a particular scenario for oil and gas exploration and development activities; these scenarios include estimates of activities such as drilling, platform installations, and structure removals. As a result of proposed CPA Lease Sale 247, there would be only minor economic changes in the Texas, Louisiana, Mississippi, Alabama, and Florida EIAs. This is because the demand would be met primarily with the existing population and labor force. Most of the employment related to proposed CPA Lease Sale 247 is expected to occur in the coastal areas of Texas

and Louisiana. The CPA proposed action, irrespective of whether one analyzes the high-case or low-case production scenario, would not cause employment effects >1 percent in any EIA along the Gulf Coast.

Accidental events associated with the CPA proposed action, such as oil spills, can cause a number of disruptions to local economies. Many of these effects are due to industries that depend on damaged resources. However, the impacts of an oil spill can be somewhat broader if companies further along industry supply chains are affected. These effects depend on issues such as the duration, methods, and logistics of the cleanup operations and the responses of policymakers to a spill. However, the impacts of small- to medium-sized spills should be localized and temporary.

Cumulative Impacts

The cumulative analysis considers the effects of OCS oil- and gas-related impact-producing factors along with non-OCS oil- and gas-related impact-producing factors that may occur and adversely affect economic factors in the same general area of the CPA proposed action. BOEM uses the model MAG-PLAN to determine the direct, indirect, and induced employment arising from a particular scenario for oil and gas exploration and development activities (i.e., drilling, platform installations, and structure removals). The CPA proposed action would not cause employment effects >1 percent in any EIA along the Gulf Coast. Oil spills can cause a number of disruptions to local economies; however, small- to medium-sized spills should have localized, temporary impacts. A low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, would have more noticeable impacts to the economy. However, the likelihood of another spill of this scale is quite low. A detailed analysis of a low-probability catastrophic spill can be found in **Appendix B**.

Non-OCS oil- and gas-related impact-producing factors that can affect economic trends in economic areas in the Gulf of Mexico region include commercial, military, recreation/tourism (refer to **Chapter 4.1.1.21**), and numerous other offshore and coastal activities. To estimate the cumulative impacts to economic factors from non-OCS oil- and gas-related impact-producing factors, BOEM employs the economic and demographic projections from Woods & Poole Economics, Inc. These projections are based on local, regional, and national trend data, as well as likely changes to local, regional, and national economic and demographic conditions. Therefore, the projections include employment associated with the continuation of current patterns in OCS oil- and gas-related leasing activity, as well as the continuation of trends in other industries important to the region. For example, these forecasts include the contributions of State oil and gas activities, renewable energy activities, coastal land use, and tourism-related activities. The cumulative impacts of the CPA proposed action would be determined by the expected path of the economy and by the expected progression of the OCS oil and gas industry in upcoming years. The expected path of the overall economy is projected using the data provided by Woods and Poole Economics, Inc. The expected economic impacts of the OCS oil and gas industry in upcoming years are estimated using the mathematical model MAG-PLAN. The cumulative impacts of the CPA proposed action to the economies along the Gulf Coast are expected to be relatively small.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/ 241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

BOEM examined a variety of Internet sources, as well as known data providers, for new information regarding the impacts of the CPA proposed action on economic factors. Beginning with this Supplemental EIS, BOEM will use new definitions of EIAs along the Gulf Coast. These EIAs were developed through a cooperative agreement with Louisiana State University (Fannin and Varnado, official communication, 2015). These EIAs aggregate counties based on analysis of trade, commuting, and demographic data; **Figure 4-5** presents these 23 EIAs. These EIAs will be used to present various data, including demographic data (refer to **Chapter 4.1.1.23.2**) and data on the scales of recreation and tourism along the Gulf Coast (refer to **Chapter 4.1.1.21**).

Lower energy prices have caused slowdowns in offshore drilling activities (Beaubouef, 2015) and rig construction (Odell, 2015). However, GOM offshore oil production is forecast to increase from an average of 1.54 MMbbl/day in 2015 to 1.63 MMbbl/day in 2016 and 1.79 MMbbl/day in 2017 (USDOE, Energy Information Administration, 2016b). This production increase reflects the contributions of

14 Gulf of Mexico projects that are expected to come online in 2016 and 2017 (USDOE, Energy Information Administration, 2016c).

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the impact conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. This information primarily relates to the onshore geographic distributions of economic impacts arising from the OCS Program, which would allow BOEM to better estimate routine and cumulative impacts. This information is difficult to obtain since most data sources do not adequately differentiate between onshore and offshore oil and gas activities. BOEM used reasonably accepted scientific methodologies to extrapolate from existing information in completing the relevant analysis and formulating the conclusions presented here. In particular, BOEM used the model MAG-PLAN to estimate the impacts of the CPA proposed action and the OCS Program. In addition, the economic impacts arising from the OCS Program are generally positive, not adverse. Therefore, BOEM has determined that the incomplete or unavailable information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for economic factors presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for economic factors presented those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.23.4. Environmental Justice

BOEM has reexamined the analysis for environmental justice presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for environmental justice presented in those NEPA documents. The analyses and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.23.4 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.23.4 of the WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.23.4 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new significant information that has become available since those documents were published is presented below.

The oil and gas industry and its associated support sectors are interlinked and widely distributed along the Gulf Coast. Offshore OCS oil- and gas-related industry operations within the CPA may utilize onshore facilities located within the WPA, CPA, or both planning areas. This analysis focuses on potential disproportionate impacts to minority and low-income populations living onshore. BOEM conducts a county-level analysis to determine the concentration of minority and low-income populations located in the same counties/parishes as oil- and gas-related onshore coastal infrastructure (refer to Chapter 4.2.1.23.4.1 and Figures 4-26 through 4-35 of the 2012-2017 WPA/CPA Multisale EIS).

In seeking public input under NEPA, the Bureau of Ocean Energy Management strives to include all perspectives and to make the process accessible to everyone who wishes to comment. Therefore, BOEM provides opportunities for public input, which includes minority and low-income populations. Some of the numerous avenues for public outreach employed by BOEM include the following: specific types of notices that are (1) mailed to public libraries, interest groups, industry, the general public, local, State, and Federal agencies, and federally recognized Indian Tribes; (2) published in local newspapers; (3) posted on the Internet; and (4) published in the *Federal Register*. These notices reflect the stages of the NEPA process and include the Notice of Intent to Prepare an EIS (NOI), the Call for Information (Call), and Notice of Availability (NOA) for the Draft Supplemental EIS. A series of specified time periods after the

NOI, Call, and NOA allow for public comments. All public comments are considered and addressed. The formal scoping process is initiated by the NOI and Call, and public scoping meetings are held in several geographically separate cities to allow for public discussion and questions, and to identify concerns of all interested parties. All public comments and responses to comments are published in the Draft and Final Supplemental EISs. A detailed discussion of the complete scoping process can be found in **Chapter 1.4**. A summary of the scoping comments for this Supplemental EIS can be found in **Chapter 5.3.2**.

Impacts of Routine Activities and Accidental Events

The potential routine impact-producing factors associated with the proposed CPA action that could affect environmental justice include the following: possible infrastructure changes or expansions including fabrication yards, support bases, and onshore disposal sites for offshore waste; increased commuter and truck traffic; and employment changes and immigration. Given the existing extensive and widespread support system for the OCS oil- and gas-related industry and its associated labor force, the effects of routine operations related to the CPA proposed action are expected to be widely distributed and to have little impact because the CPA proposed action would not significantly change the already existing conditions, such as traffic or the amount of infrastructure. Impacts related to routine operations are expected to be primarily economic in nature and to have a limited but positive effect because the CPA proposed action would contribute to the sustainability of the current industry, related support services, and associated employment, especially in Louisiana where an extensive concentration of OCS oil- and gas-related infrastructure is located, e.g., Port Fourchon in Lafourche Parish. BOEM's county-level analysis determined that there are limited concentrations of minority and low-income population adjacent to OCS oil- and gas-related coastal infrastructure. The routine operations associated with the CPA proposed action are not expected to have a disproportionate negative effect on these populations. Rather, the CPA proposed action would contribute to the maintenance of current OCS oil- and gas-related activity and employment levels, resulting in some beneficial direct and indirect effects to low-income and minority populations, e.g., jobs. When oil and gas companies make decisions to either maintain current levels of employment or hire more workers or contract out more services, this creates a chain reaction that reverberates through the economy, also known as a multiplier effect, and that maintains or generates positive demand along the supply chain as support sectors hire people who, in turn, pay for goods and services throughout the local and regional economies (Loren C. Scott & Associates, Inc., 2014). Also refer to **Chapter 4.1.1.23.3**, "Economic Factors."

Accidental disturbances resulting from the CPA proposed action, including oil spills, vessel collision, and chemical/ drilling fluids spills, have the potential to negatively affect minority and low-income populations through direct exposure to oil, dispersants, degreasers, and other chemicals that can affect human health; decreased access to natural resources due to environmental damages, fisheries closures, or wildlife contamination; and proximity to onshore disposal sites used in support of oil and chemical spill cleanup efforts. Oil, chemical, and drilling fluid spills may be associated with exploration, production, or transportation activities that result from the CPA proposed action. Low-income and minority populations might be more sensitive to spills in coastal waters than are the general population because of their potentially higher dietary reliance on wild coastal resources, reliance on these resources for other subsistence purposes such as sharing and bartering, limited flexibility in substituting wild resources with purchased ones, and likelihood of participating in cleanup efforts and other mitigating activities.

Little is known about subsistence along the Gulf Coast, and BOEM is currently funding a study to better document subsistence in the region.

As studies of past oil spills have highlighted, different cultural groups can possess varying capacities to cope with these types of events (Palinkas et al., 1992). Some minority and/or low-income groups may be more reliant on natural resources and/or less equipped to substitute contaminated or inaccessible natural resources with private market offerings than higher income level and/or nonminority groups. Because lower-income and/or minority populations may live near and may be directly involved with spill cleanup efforts, the vectors of exposure can be higher for them than for the general population, increasing the potential risks of long-term health effects. However, small-scale accidental oil spills, vessel collision, and chemical/drilling fluids spills are not likely to be of sufficient size or duration to have adverse and disproportionate long-term effects for minority and low-income populations in the analysis area.

Cumulative Impacts

The cumulative analysis considers impacts that may result from the CPA proposed action within the context of OCS oil- and gas-related and non-OCS oil- and gas-related impact-producing factors for environmental justice. The OCS oil- and gas-related impact-producing factors include OCS leasing, exploration, development, and production activities and the accidental events arising from these OCS oil- and gas-related activities. Non-OCS oil- and gas-related impact-producing factors include all human activities and natural events and processes. The context in which people may find themselves and how that context affects their ability to respond to an additional change in the socioeconomic or physical environment is the heart of an environmental justice analysis.

The OCS oil- and gas-related impact-producing factors include the OCS Program, which includes OCS oil and gas leasing, exploration, development, and production activities that could result in potential infrastructure changes/expansions, including fabrication yards, support bases, and onshore disposal sites for offshore waste; increased commuter and truck traffic; and employment changes and immigration, as well as accidental events arising from these OCS oil- and gas-related activities, such as oil spills, vessel collisions, chemical/drilling-fluid spills, and the resultant cleanup that may temporarily affect low-income populations who may experience direct exposure to contaminants through subsistence and cleanup operations. However, this exposure is expected to be small scale and short term and not result in disproportionate long-term effects because of the small scale and size of these events. A detailed analysis of a low-probability catastrophic event, such as the *Deepwater Horizon* explosion, oil spill, and response, can be found in **Appendix B**. In general, the cumulative OCS oil- and gas-related effects are expected to be widely distributed and to have a limited but positive effect on low-income and minority populations in the form of economic benefits, such as employment. In Louisiana, these positive economic effects are expected to be greater because of the existence of an extensive and widespread support system for OCS oil- and gas-related activities and associated labor force, especially in Lafourche Parish, Louisiana, where Port Fourchon is located. Given the existing distribution of the OCS oil and gas industry and the limited concentrations of minority and low-income populations near oil and gas infrastructure, based on county-level analysis, the CPA proposed action and the cumulative OCS Program are not expected to have disproportionate high/adverse environmental or health effects on minority or low-income populations.

Non-OCS oil- and gas-related cumulative effects cover a wide range of potential impact-producing factors, including all human activities and natural events and processes that are not related to OCS oil- and gas-related activities in Federal waters. Some of the human activities that could disproportionately affect low-income and minority populations include, but are not limited to, the following: urbanization; pollution (air, light, noise, garbage dumping, and contaminated runoff); commercial/residential/ agricultural development; zoning ordinances; community development strategies (multi-purpose and single-use); expansions to the Federal, State and local highway systems; expansions to regional port facilities; military activities; demographic shifts (in-migration and out-migration); economic shifts on the national, State and local levels (job creation and job losses); educational systems (quality, availability, expansions or contractions); family support systems (availability, proximity and quality of mental health services, foster care, charity hospital systems, addictive disorders rehabilitation centers, family planning services, early learning programs, etc.); governmental functions (municipal waterworks systems, sewage systems, tax structures, revenue collection, law enforcement, fire protection, traffic control, voting processes, legislative processes, court procedures and processes, real estate property assessments, construction permits, environmental protection services, land-use permits, etc.); contraction or expansion of the tourism industry; financial system (banking and investment services); State renewable energy activities; river channelization; dredging of waterways; State oil and gas activity; existing infrastructure associated with downstream activities such as petrochemical processing; and public health issues.

While human activities are extensive and nearly all-encompassing, there are a substantial number of natural events and processes that may be classified as non-OCS oil- and gas-related cumulative effects that may disproportionally affect low-income and minority populations including: oyster reef degradation; saltwater intrusion; sedimentation of rivers; sediment deprivation; barrier island migration and erosion; fish kills; red tide; beach strandings; coastal erosion/subsidence; sea-level rise; and coastal storms. Both human-induced and natural factors, unrelated to OCS oil- and gas-related activities, could affect minority and low-income populations through exposure to high levels of pollution, job loss, reduced social services, adverse infrastructure siting, decreased tourism, public health issues, displacement, and increased risk of adverse impacts from storm surge, reduced opportunities for

subsistence activities, and vulnerability of coastal communities to name a few. For a detailed discussion of these non-OCS oil- and gas-related cumulative effects on low income and minority populations, refer to Chapter 4.1.1.23.4 of the CPA 235/241/247 Supplemental EIS.

To summarize, the cumulative effects of the CPA proposed action on minority and low-income populations would be concentrated in coastal areas, and particularly in Louisiana. Most OCS Program effects are expected to make a positive contribution to minority and low-income populations by helping to maintain current employment levels and contributing to economic stimulation. The contribution of the cumulative OCS Program to the cumulative impacts of all factors affecting environmental justice is expected to be minor; therefore, the incremental contribution of the CPA proposed action to the cumulative impacts would also be minor. State offshore leasing programs have similar, although more limited, effects due to their smaller scale. Cumulative effects from onshore infrastructure, including waste facilities, are also expected to be minor because existing infrastructure is regulated, because little new infrastructure is expected to result in the cumulative case, and because any new infrastructure will be subject to relevant permitting requirements. While all human activities and natural events and processes also may raise environmental justice issues, the cumulative consequences to environmental justice cannot be determined. The enormity of such a task i.e., the time, labor, and funds that would be necessary to assess and analyze the entirety of non-OCS oil- and gas-related factors' impacts, would not be cost effective or even possible to accomplish. When added to existing State and Federal leasing programs, the associated onshore infrastructure, onshore and offshore OCS oil- and gas-related activities and all of the non-OCS oil- and gas-related impacting factors, a single proposed CPA lease sale would make miniscule contributions to the cumulative effects on minority and low-income populations.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search of various information sources and trade publications (U.S. Department of Health and Human Services, National Institutes of Health; USEPA; USDOC, Bureau of the Census and Bureau of Labor Statistics; U.S. Department of Homeland Security, Federal Emergency Management Agency; RestoreTheGulf.gov website; *Deepwater Horizon* Claims Center; *Deepwater Horizon* Oil Spill Portal; Louisiana Department of Environmental Quality; Mississippi Department of Environmental Quality; Alabama Department of Environmental Management; State of Florida Department of Environmental Protection; Louisiana Recovery Authority; Louisiana Office of Community Development; The Greater Lafourche Port Commission; LA1 Coalition; Reuters; Rigzone; *Oil and Gas Journal*; and The Oil Drum), as well as recently published journal articles, was conducted to determine the availability of recent information on environmental justice. The search revealed the following new information on claims and human health impacts from the *Deepwater Horizon* explosion, oil spill, and response. This information is important because it expands our knowledge of the baseline environment following the *Deepwater Horizon* explosion, oil spill, and response.

Legal proceedings that could benefit some members of minority and low-come populations have come to a close. The *Deepwater Horizon* Economic and Property Damages Settlement was finalized on June 8, 2015, 1 year and 4 months after the effective date of the Medical Benefits Settlement on February 12, 2014 (*Deepwater Horizon* Claims Center, 2015). The Federal Government and five Gulf Coast States settled a law suit with BP and other parties in the summer of 2015; this settlement paves the way for billions of dollars in money to be channeled to coastal restoration and other projects (Schleifstein, 2015). While these monies may eventually benefit minority and low-income populations indirectly, none of this new information would alter the impact conclusion for environmental justice presented in the prior 2012-2017 Gulf of Mexico EISs. The analysis and potential impacts discussed in those NEPA documents still apply for proposed CPA Lease Sale 247.

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions from the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in this Supplemental EIS, as well as in the previously mentioned NEPA documents, BOEM has identified unavailable information regarding the

impacts of the *Deepwater Horizon* explosion, oil spill, and response related to environmental justice, including long-term and cumulative health impacts to oil-spill cleanup workers and issues relating to subsistence and other indigenous reliance on natural resources. This information cannot be obtained because long-term health impact studies, subsistence studies, and the NRDA process are ongoing, and data from these efforts will be unavailable and unobtainable until the studies and NRDA process are complete. In order to fill this data gap, BOEM used existing information and reasonably accepted scientific methodologies to extrapolate from available information in completing the relevant analysis including limited information that has been released after the *Deepwater Horizon* explosion, oil spill, and response and studies of past oil spills, which indicate that a low-probability, catastrophic oil spill, which is not part of the CPA proposed action and not likely expected to occur, may have significant adverse impacts on lower-income and minority communities. Long-term effects are unknown at this time, but so far there has been little concrete evidence that health or subsistence effects have occurred (Brown et al., 2011; Dickey, 2012; King and Gibbons, 2011; Middlebrook et al., 2012; U.S. Dept. of Labor, Occupational Safety and Health Administration, 2010a and 2010b), although there is some dispute in the scientific community about proper risk assessment standards in seafood contamination research (Rotkin-Ellman et al., 2012; Rotkin-Ellman and Soloman, 2012). In addition, some studies have shown that different cultural groups can possess varying levels of coping capacities (Palinkas, 1992), and impacts to social cohesion, including increased distrust in government and other institutions, contributed to community anxiety (Tuler et al., 2009). Also, because lower-income and/or minority populations may live near and be involved directly with spill cleanup efforts, the vectors of exposure can be higher for them than for the general population, increasing the potential risks of long-term health effects. Therefore, because long-term health and subsistence impacts and to low-income and minority populations are unknown, this information may be relevant to the evaluation of impacts from the *Deepwater Horizon* explosion, oil spill, and response to environmental justice. However, a subsistence study and long-term health studies are pending and will not be available within the timeline contemplated in the NEPA analysis of this Supplemental EIS. BOEM will continue to seek additional information as it becomes available and bases the previous analysis on the best information currently available. Although long-term health or subsistence impacts to minority and low-income populations may be relevant to this analysis, BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives based on the information discussed above.

Summary and Conclusion

BOEM has reexamined the analysis for environmental justice presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for environmental justice presented in those NEPA documents because of the available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. The analysis and potential impacts in those documents still apply for proposed CPA Lease Sale 247.

4.1.1.24. Species Considered due to U.S. Fish and Wildlife Service Concerns

BOEM has reexamined the analysis for species considered due to FWS concerns presented in the prior 2012-2017 Gulf of Mexico EISs based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for species considered due to FWS concerns presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

A detailed description of the affected environment and the full analyses of the potential impacts of routine activities, accidental events, and cumulative impacts associated with the CPA proposed action are presented in Chapter 4.2.1.24 of the 2012-2017 WPA/CPA Multisale EIS. Updated information is provided in Chapter 4.2.1.24 of the WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.24 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS. The following information is a summary of the resource description and impact analysis incorporated from those NEPA documents. Any new information that has become available since those documents were published is presented below.

The species considered are the Louisiana black bear (*Ursus americanus luteolus*), gopher tortoise (*Gopherus polyphemus*), Alabama red-belly turtle (*Pseudemys alabamensis*), ringed map turtle (*Graptemys oculifera*), black pine snake (*Pituophis melanoleucus lodingi*), yellow-blotched map turtle (*Graptemys flavimaculata*), eastern indigo snake (*Drymarchon corais couperi*), Mississippi gopher frog (*Rana capito sevosa*), frosted flatwoods salamander (*Ambystoma cingulatum*), reticulated flatwoods salamander (*Ambystoma bishopi*), pallid sturgeon (*Scaphirhynchus albus*), pearl darter (*Percina aurora*), inflated heelsplitter (*Potamilus inflatus*), Louisiana quillwort (*Isoetes louisianensis*), and telephus spurge (*Euphorbia telephioides*). Some species considered due to FWS concerns are discussed in other chapters of this Supplemental EIS. The conclusions for the following species can be found in their respective chapters: West Indian manatee (*Trichechus manatus*) (**Chapter 4.1.1.12**); Gulf sturgeon (*Acipenser oxyrinchus desotoi*) (**Chapter 4.1.1.17**); green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*) sea turtles (**Chapter 4.1.1.13**); Alabama beach mouse (*Peromyscus polionotus ammobates*) and Perdido Key beach mouse (*Peromyscus polionotus trissyllepsis*) (**Chapter 4.1.1.15**); and red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*), red-cockaded woodpecker (*Picoides borealis*), least tern (*Sterna antillarum*), Mississippi sandhill crane (*Grus canadensis pulla*), wood stork (*Mycteria americana*), and mountain plover (*Charadrius montanus*) (**Chapter 4.1.1.16**).

Impacts of Routine Activities and Accidental Events

Adverse impacts due to routine activities resulting from the CPA proposed action, such as operational discharges, noise, and marine debris, are possible but unlikely. Lethal effects could occur from ingestion of released plastic materials from OCS oil- and gas-related vessels and facilities. However, there have been no reports to date on such incidences. Because of the mitigations that may be implemented (**Chapter 2.3.1.3**), routine activities (e.g., operational discharges, noise, and marine debris) related to the CPA proposed action are not expected to have long-term adverse effects on the size and productivity of any of these species or populations in the Gulf of Mexico. Greatly improved handling of waste and trash by industry and annual awareness training required by the marine debris mitigations are reducing the amount of plastics in the ocean, and therefore minimizing the devastating effects on offshore and coastal marine life. The routine activities of the CPA proposed action are unlikely to have significant adverse effects on the size and recovery of any of the above-mentioned species or populations in the GOM due to the distance of most activities, the heavy regulation of infrastructure and pipelines, and permitting and siting requirements.

Accidental oil spills and spill-response activities resulting from the CPA proposed action have the potential to impact small to large areas in the Gulf of Mexico with physical oiling and habitat destruction. The severity of impacts depends on the magnitude and frequency of accidents, the ability to respond to accidents, the location and date of accidents, and various meteorological and hydrological factors (including tropical storms). Adverse impacts due to accidental events are also likely to be minimal because the habitats used by the species considered are far from OCS oil- and gas-related activities and are inland. Therefore, the CPA proposed action would be expected to have little or no effect on these species of concern.

Cumulative Impacts

The cumulative analysis considers activities that have occurred, are currently occurring, and could occur and adversely affect species considered due to FWS concerns. The OCS oil- and gas-related activities that could impact species considered due to FWS concerns include operational discharges, noise, marine debris, oil spills, and spill-response activities. Routine activities are not anticipated to impact these species because of the mitigations and regulations implemented by BOEM, and accidental events are expected to be minimal to these species because the habitats used by the species considered are far from OCS oil- and gas-related activities and are inland. A low-probability catastrophic spill, which is not part of the CPA proposed action and not likely expected to occur, could impact species considered due to FWS concerns and is discussed in **Appendix B**.

Non-OCS oil- and gas-related activities that could impact species considered due to FWS concerns include State oil and gas activities, other governmental and private projects and activities, hurricanes, and

natural processes and events that may occur and that adversely affect wetland habitat. Non-OCS oil- and gas-related activities posing the greatest potential harm to species considered due to FWS concerns are factors such as habitat loss and ecological competition. These factors have historically proved to be of greater threat to these species of concern. Impacts may also occur to these species if a hurricane passes over an oil spill or causes spills itself. However, at this time, there is no known record of a hurricane crossing the path of a large oil spill; the impacts of such have yet to be determined. The experience from Hurricanes Katrina and Rita in 2005 was that the oil released during the storms widely dispersed as far as the surge reached, reducing impacts from concentrated oil exposure (USDOC, NOAA, 2010).

Non-OCS oil- and gas-related activities have a greater potential to impact species considered due to FWS concerns than OCS oil- and gas-related activities, especially those factors that contribute to habitat loss. Because these species rely on terrestrial habitats to carry out their life-history functions at a considerable distance from the GOM, the activities of the CPA proposed action are unlikely to have significant adverse effects on the size and recovery of any of the above populations. Therefore, the incremental contribution of the CPA proposed action would not be likely to result in a significant incremental impact on these species within the CPA.

New Information Available Since Publication of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS

A search of information sources (FWS's websites), as well as recently published journal articles, was conducted to determine the availability of recent information on species considered due to FWS concerns. The search revealed no new information pertinent to this Supplemental EIS. As of February 13, 2015, the data available in the species reports on the FWS online environmental conservation system have been updated to use a different set of information. The results are based on where species are believed or known to occur in order to provide a better representation of species occurrence.

The NRDA Trustees' recently published Final PDARP/PEIS identifies negative impacts to four species of federally endangered or threatened sea turtles (i.e., Kemps' ridley, green, loggerheads, and hawksbill) related to oil exposure both offshore and in shallower waters closer to shore and due to oil-spill response activities. The Trustees estimated the number of Gulf sturgeon that were potentially exposed to *Deepwater Horizon* oil in nearshore areas (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016).

Incomplete or Unavailable Information

Even after evaluating the information above, BOEM has determined that the new information does not change the conclusions of the prior 2012-2017 Gulf of Mexico EISs; nevertheless, there is still incomplete or unavailable information. As discussed in Chapter 4.2.1.24 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS and Chapter 4.1.1.24 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, BOEM has identified incomplete information on the impacts to species considered due to FWS concerns as a result of the *Deepwater Horizon* explosion, oil spill, and response because little data have been released to the public. As data continue to be gathered and impact assessments completed, a better characterization of the full scope of impacts to populations in the GOM from the *Deepwater Horizon* explosion, oil spill, and response will be available. Relevant data on the status of populations after the *Deepwater Horizon* explosion, oil spill, and response may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion, oil spill, and response may be difficult or impossible to discern from other factors. Therefore, it is not possible for BOEM to obtain this information within the timeline contemplated in the NEPA analysis of this Supplemental EIS, regardless of the cost or resources needed. In light of the incomplete or unavailable information, BOEM's subject-matter experts have extrapolated from available scientifically credible evidence in this analysis. Based on life histories of these species and the fact that they live inland, BOEM has determined that these species within the CPA were not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and response. Although the body of available information is incomplete, the information extrapolated from life history of the species and distance of the *Macondo* well from their habitats was sufficient to draw reasonable conclusions that they should not have

been impacted by the *Deepwater Horizon* explosion, oil spill, and response; therefore, BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

There is a long-standing and well-developed OCS Program of more than 50 years within the CPA, and there are no data to suggest that activities from the preexisting OCS Program are significantly impacting the above-mentioned species populations; therefore, the CPA proposed action would be expected to have little or no effect on the above-mentioned species. Because of the mitigations that may be implemented, routine activities (e.g., operational discharges, noise, and marine debris) related to the CPA proposed action are not expected to have long-term adverse effects on the size and productivity of any of these species or populations in the GOM. Lethal effects could occur from ingestion of accidentally released plastic materials from OCS oil- and gas-related and non-OCS oil- and gas-related vessels and facilities. However, there have been no reports to date on such incidences. BOEM employs several measures (e.g., marine debris mitigations) to reduce the potential impacts to any animal from routine activities associated with the CPA proposed action. Accidental oil spills and spill-response activities resulting from the CPA proposed action have the potential to impact small to large areas in the GOM, depending on the magnitude and frequency of accidents, the ability to respond to accidents, the location and date of accidents, and various meteorological and hydrological factors (including tropical storms). The incremental contribution of the CPA proposed action would not be likely to result in a significant incremental impact on the above-mentioned species within the CPA; in comparison, non-OCS oil- and gas-related activities, such as habitat loss and competition, have historically proven to be a greater threat to the above-mentioned species.

BOEM has reexamined the analysis for species considered due to FWS concerns presented in the prior 2012-2017 Gulf of Mexico EISs based on the information presented above. No new significant information was discovered that would alter the impact conclusion for species considered due to FWS concerns presented in those NEPA documents. The analysis and potential impacts discussed in those documents still apply for proposed CPA Lease Sale 247.

4.1.2. Alternative B—Exclude the Unleased Blocks Near Biologically Sensitive Topographic Features

Description of the Alternative

Alternative B differs from Alternative A (the Proposed Action) by not offering blocks that are possibly affected by the proposed Topographic Features Stipulation (**Chapter 2.3.1.3.1** of this Supplemental EIS and Chapter 2.4.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS). All of the assumptions (including the nine other potential mitigating measures) and estimates are the same as for the proposed action (Alternative A). A description of Alternative A is presented in **Chapter 2.3.1.1**. There are 207 blocks (962,470 ac) in the CPA in which the Topographic Features Stipulation may be applied (**Figure 2-1**). The currently unleased blocks with these features would not be available for lease under Alternative B during this proposed lease sale. The number of unleased blocks that would not be offered under Alternative B represents only a small percentage of the total number of blocks to be offered under Alternative A; therefore, it is assumed that the levels of activity for Alternative B would be essentially the same as those projected for the CPA proposed action (refer to **Chapter 2.3.2** for further details). The estimated amount of resources projected to be developed under Alternative B is within the same scenario range as for Alternative A, i.e., 0.116-0.200 BBO and 0.538-0.938 Tcf of gas.

All of the assumptions, including the nine other potential stipulations (i.e., the Live Bottom Stipulation; Military Areas Stipulation; Evacuation Stipulation; Coordination Stipulation; Blocks South of Baldwin County, Alabama, Stipulation; Protected Species Stipulation; United Nations Convention on the Law of the Sea Royalty Payment Stipulation; Below Seabed Operations Stipulation; and the Stipulation on the Agreement between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico, as described in **Chapter 2.2.1.3**), are the same as for the CPA proposed action (Alternative A). A description of Alternative A is presented in **Chapter 2.3.1.1**. The Topographic Features Stipulation would not be applied with Alternative B because the blocks that could be affected by the Topographic Features Stipulation would not be offered for lease.

Because the incremental contribution of Alternative A (the Proposed Action) to the cumulative impacts on topographic features is expected to be slight and because negative impacts should be restricted by the implementation of the Topographic Features Stipulation and site-specific mitigations, the depths of the features, and water currents in the topographic feature area, Alternative A is not expected to result in adverse impacts greater than Alternative B. Therefore, since both Alternatives A and B minimize the potential for adverse impacts to Topographic Features, but since Alternative A better meets the purpose and need by providing a greater level of flexibility when considering oil and gas exploration, development, and production activities, Alternative A is BOEM's preferred alternative.

Effects of the Alternative

The following analyses are based on the scenario for the CPA proposed action (Alternative A). The scenario provides assumptions and estimates on the amounts, locations, and timing for OCS oil- and gas-related exploration, development, and production operations and facilities, both offshore and onshore. These are estimates only and not predictions of what would happen as a result of holding proposed CPA Lease Sale 247. A detailed discussion of the scenario and related impact-producing factors is presented in **Chapter 3.1** of this Supplemental EIS and in Chapter 3.1 of the 2012-2017 WPA/CPA Multisale EIS, and updated information is provided in Chapter 3.1 of the WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

The analyses of impacts to the various resources under Alternative B are very similar to those for Alternative A. The reader should refer to the appropriate discussions under Alternative A for additional and more detailed information regarding impact-producing factors and their expected effects on the various resources. Impacts under Alternative B are expected to be the same as the CPA proposed action (**Chapter 4.1.1**) for the following resources:

- Air Quality
- Water Quality
- Coastal Barrier Beaches and Associated Dunes
- Wetlands
- Seagrass Communities
- Live Bottoms (Pinnacle Trend and Low Relief)
- *Sargassum* Communities
- Chemosynthetic and Nonchemosynthetic Deepwater Benthic Communities
- Soft Bottom Benthic Communities
- Marine Mammals
- Sea Turtles
- Diamondback Terrapins
- Beach Mice
- Coastal and Marine Birds
- Gulf Sturgeon
- Fish Resources and Essential Fish Habitat
- Commercial Fisheries
- Recreational Fishing
- Recreational Resources
- Archaeological Resources
- Human Resources and Land Use
- Species Considered due to U.S. Fish and Wildlife Service Concerns

The impacts to some Gulf of Mexico resources under Alternative B would be slightly different from the impacts expected under the CPA proposed action (Alternative A). These impacts are described below.

Impacts on Topographic Features

The sources and severity in impacts associated with this alternative are those lease sale-related activities discussed for the CPA proposed action. The potential impact-producing factors to the topographic features of the CPA are anchoring and structure emplacement, effluent discharge, loss of well control events, oil spills, and structure removal. A more detailed discussion of these potential impact-producing factors and the appropriate mitigating measures are presented in **Chapter 2.3.1.3.1** of this Supplemental EIS and Chapter 2.4.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impacts of Routine Activities and Accidental Events

Of the 16 topographic features in the CPA, 16 are located within water depths less than 210 m (689 ft). Combined, these features occupy a small portion of the CPA. Of the potential impact-producing factors that may affect topographic features, anchoring, structure emplacement, effluent discharge, loss of well control, and structure removal would be eliminated by the adoption of this alternative because blocks near enough to the banks for these events to have an impact on the biota of the banks would have been excluded from leasing under this alternative. Thus, the only impact-producing factor remaining from routine operations in blocks included in this alternative (i.e., those blocks not excluded by this alternative) is an oil spill. The potential impacts from oil spills are summarized below and are discussed further in **Chapter 3.2.1** of this Supplemental EIS and Chapter 3.2.1 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

A subsurface spill would have no effect on a biologically sensitive feature unless the oil or its dissolved components comes into direct contact with the habitat. Oil from a subsurface spill is expected to rise to the sea surface, based on the specific gravity of Gulf of Mexico oil. An exception to this could occur if oil is released at the seafloor under pressures associated with depths beyond the coastal shelf. This can result in the atomization of oil into micro-droplets with little buoyancy. Under these conditions, a subsea oil plume could most likely travel laterally with the prevailing currents, although it could potentially travel upslope during an upwelling event. However, upwelling events are limited to a specific set of meteorological conditions (Zavala-Hidalgo et al., 2006; Walker, 2005; Feng et al., 2014). This can also happen if chemical dispersants are used underwater, forming a plume. If a subsea oil plume does form, the oil is expected to be swept clear of the banks because prevailing currents travel around the banks rather than over them (Rezak et al., 1983). As the oil travels in the water column, it will become diluted from its original concentration. Transient concentrations of oil below 20 ppm are not expected to result in lasting harm to a coral reef (Shigenaka, 2001). Another exception, although unlikely, is the potential mixing of oil and/or dispersant contaminated surface waters throughout the water column during a tropical storm (Silva et al., 2015). If surface waters were mixed to depth and were to come into contact with a topographic feature near the shelf edge, it is possible that there could be damage to benthic communities on topographic features. The fact that the topographic features are widely dispersed in the CPA, combined with the random nature of spill events, would serve to limit the likelihood of a spill occurring near a topographic feature. In addition, the exclusion of blocks adjacent to topographic features from the proposed CPA lease sale would further distance potential spills from the habitat. Chapter 4.2.1.7 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.7 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS discuss the risk of spills interacting with topographic features in more detail. The currents that move around the banks would likely steer any spilled oil around the banks rather than directly upon them, lessening impact severity. In the unlikely event that oil from a subsurface spill would reach the biota of a topographic feature, the effects would be primarily sublethal for most of the adult sessile biota. Lethal effects would probably be limited to a few coral colonies (CSA, 1992 and 1994). If oil from a subsurface spill contacted a coral-covered area, the areal extent of coral mortality would be limited, but long-lasting sublethal effects may be incurred by organisms surviving the initial effects of a spill (Jackson et al., 1989). Stress resulting from the oiling of reef coral colonies could affect their resilience to natural disturbances (e.g., elevated water temperature and diseases) and may hamper their ability to reproduce. A complete recovery of such an affected area could take in excess of 10 years. Similarly, contaminated surface waters mixed by a tropical storm event to depth could have similar lethal and sublethal effects to communities of a topographic feature (Silva et al., 2015).

Cumulative Impacts

With the exception of the topographic features, the cumulative impacts of Alternative B on the environmental and socioeconomic resources of the CPA would be identical to Alternative A. The incremental contribution of the CPA proposed action to the cumulative impacts on topographic features is expected to be slight, and negative impacts should be restricted by the implementation of the Topographic Features Stipulation and site-specific mitigations, the depths of the features, and water currents in the topographic feature area.

Summary and Conclusion

Alternative B, if adopted, would prevent any OCS oil- and gas-related activity whatsoever in the blocks containing topographic features and their surrounding protective zones; thus, it would eliminate any potential direct impacts to the biota of those blocks from routine oil- and gas-related activities within the blocks. In the unlikely event that oil from a subsurface spill contacts the biota of a topographic feature, the effects would be localized and primarily sublethal for most of the adult sessile biota. Some lethal effects would probably occur upon oil contact to coral colonies.

Environmental impacts of Alternative B would be almost indistinguishable from Alternative A with the Topographic Features Stipulation in place. There would be an economic impact to the extent that economic returns from the excluded lease blocks would not be realized.

4.1.3. Alternative C—No Action

Description of the Alternative

Alternative C is the cancellation of the proposed CPA lease sale. If this alternative is chosen, the opportunity for development of the estimated 0.460-0.894 BBO and 1.939-3.903 Tcf of gas that could have resulted from the proposed CPA lease sale would be precluded during the current 2012-2017 Five-Year Program, but it could again be contemplated as part of a future Five-Year Program. Proposed CPA Lease Sale 247 is the last CPA lease sale in the current Five-Year Program. Typically, in past programs, there were planning area lease sales, with one CPA lease sale per year. However, the 2017-2022 Five-Year Program may have two regionwide lease sales each year, and future lease sales will be dependent on decisions made in the 2017-2022 Five-Year Program, as determined in the Final Program document. The No Action alternative encompasses the same potential impacts as a decision to delay the proposed CPA lease sale to a later scheduled lease sale under the 2017-2022 Five-Year Program, when another decision on whether to hold that future lease sale is made. Delay of the proposed CPA lease sale was not considered as a separate alternative from Alternative C because the potential impacts are the same, namely that most impacts related to Alternative A would not occur as described below. Any potential environmental impacts resulting from the proposed CPA lease sale would not occur or would be postponed to a future lease sale decision. This alternative is also analyzed in the EIS for the 2012-2017 Five-Year Program on a nationwide programmatic level.

Effects of the Alternative

BOEM's predecessor agency published a report that examined previous exploration and development activity scenarios (USDOI, MMS, 2007). The report compared forecasted activity with the actual activity from 14 WPA and 14 CPA lease sales. The report shows that many lease sales contribute to the present level of OCS oil- and gas-related activity, and any single lease sale accounts for only a small percentage of the total OCS oil- and gas-related activities. In 2006, leases from 92 different sales contributed to Gulf of Mexico production. An average WPA lease sale contributed to 3 percent of oil production and 3 percent of gas production in the WPA, while an average CPA lease sale contributed to 2 percent of oil production and 2 percent of gas production in the CPA. In 2006, leases from 15 different sales contributed to the installation of production structures in the Gulf of Mexico. An average WPA lease sale contributed to 6 percent of the installation of production structures in the WPA, while an average CPA lease sale contributed to 6 percent of the installation of production structures in the CPA. In 2006, leases from 70 different sales contributed to wells drilled in the Gulf of Mexico. An average WPA lease sale contributed to 6 percent of the wells drilled in the WPA, while an average CPA lease sale contributed to 4 percent of the wells drilled in the CPA.

As in the past, the proposed CPA lease sale would contribute to maintaining the present level of OCS oil- and gas-related activity in the Gulf of Mexico. Exploration and development activity, including service-vessel trips, helicopter trips, and construction that would result from the proposed CPA lease sale would replace activity resulting from existing leases that have reached, or are near the end of, their economic life.

In the short term, however, it is important to note that activities under previous lease sales would continue in the Gulf of Mexico, including exploration, development, production, and decommissioning activities. As a decision on the proposed CPA lease sale will not affect those preexisting leases and

activities related to them, there may still be environmental impacts occurring in the Gulf in the short term, even if the proposed CPA lease sale is cancelled.

Environmental Impacts

If the proposed CPA lease sale were to be cancelled, the overall level of OCS oil- and gas-related activity in the CPA would only be reduced by a small percentage, if any. Therefore, the cancellation of the proposed CPA lease sale would not significantly change the environmental impacts of overall OCS oil- and gas-related activity in the long term. The environmental impacts expected to result from the CPA proposed action, which are described above, would not occur in the short term, but they would likely be postponed to any future lease sale.

Economic Impacts

Although environmental impacts may be reduced or postponed by cancelling the proposed CPA lease sale, the economic impacts of cancelling the scheduled lease sale should be given consideration. Chapter 4.2.1.23.3 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.23.3 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS discuss the potential economic impacts of the CPA proposed action. In the event that the proposed CPA lease sale is cancelled or postponed, there may be impacts to employment along the Gulf Coast, but these are not expected to be significant (e.g., not cause employment effects >1% in any EIA along the Gulf Coast or less than 1% of total employment) or long term given the existing OCS infrastructure.

Federal, State, and local governments would also have to forgo the revenue that would have been received from the proposed CPA lease sale. There could be minor impacts on global energy prices from cancelling the proposed CPA lease sale, along with minor changes in energy consumption patterns that would result from these price changes.

Other factors may minimize or exacerbate the economic impacts of cancelling the proposed CPA lease sale. For example, the longer-term economic impacts of cancelling the CPA proposed lease sale could be minimized if they were offset by a larger lease sale at a later date. The economic impacts may be exacerbated if additional lease sales are cancelled. The OCS industry is dependent on high capital investment costs and there may be long lags between the lease sale and the majority of production activities. Therefore, firms' investment and spending decisions are dependent on their confidence that the OCS Program will be maintained in the future. In addition, while firms in the OCS industry are generally likely to be able to weather the cancellation of a single lease sale, the cancellation of multiple lease sales could lead to broader damage to firms and workers in the industry or decisions to operate in areas other than the Gulf. These economic impacts would be particularly damaging to the coastal counties and parishes in Texas and Louisiana for which the OCS industry as a whole is an important component of their economies.

Summary and Conclusion

Cancelling the proposed CPA lease sale would eliminate the effects described for Alternative A (**Chapter 4.1.1**); however, any single lease sale in the CPA accounts for only a small percentage of the total OCS oil- and gas-related activities in the GOM. If the proposed CPA lease sale were to be cancelled, the resulting development of oil and gas would most likely be postponed to a future lease sale; therefore, the overall level of OCS oil- and gas-related activity in the CPA would only be reduced by a small percentage, if any. Therefore, the cancellation of the proposed CPA lease sale would not significantly change the environmental impacts of overall OCS oil- and gas-related activity in the long term.

Federal, State, and local governments would have to forgo the revenue that would have been received from the proposed CPA lease sale. There could be minor impacts on global energy prices from cancelling the proposed CPA lease sale, along with minor changes in energy consumption patterns that would result from these price changes. Other factors may minimize or exacerbate the economic impacts of cancelling the proposed CPA lease sale.

4.2. UNAVOIDABLE ADVERSE IMPACTS OF THE PROPOSED ACTION

Unavoidable adverse impacts associated with the CPA proposed action are expected to be primarily short term and localized in nature and are summarized below. Adverse impacts from low-probability catastrophic events, which are not a part of the CPA proposed action and not likely expected to occur, could be of longer duration and extend beyond the local area. All OCS oil- and gas-related activities involve temporary and exclusive use of relatively small areas of the OCS over the lifetimes of specific projects. Lifetimes for these activities can be days, as in the case of seismic surveys; or decades, as in the case of a production structure or platform. No activities in the OCS Program involve the permanent or temporary use or "taking" of large areas of the OCS on a semicontinuous basis. Cumulatively, however, a multitude of individual projects results in a major use of OCS space.

Sensitive Coastal Habitats: If an oil spill contacts beaches or barrier islands, the removal of beach sand during cleanup activities could result in adverse impacts if the sand is not replaced. In addition, a beach could experience several years of tarballs washing ashore over time, causing an aesthetic impact. Sand borrowing on the OCS for coastal restorations involves the taking of a quantity of sand from the OCS and depositing it onshore, essentially moving small products of the deltaic system to another location. If sand is left where it is, it would eventually be lost to the deltaic system by redeposition or burial by younger sediments; if transported onshore, it would be lost to burial and submergence caused by subsidence and sea-level rise.

If an oil spill contacts coastal wetlands, adverse impacts could be high in localized areas. In more heavily oiled areas, wetland vegetation could experience suppressed productivity for several years; in more lightly oiled areas, wetland vegetation could experience die-back for one season. Epibionts on wetland vegetation and grasses in the tidal zone could be killed, and the productivity of tidal marshes for the vertebrates and invertebrates that use them to spawn and develop could be impaired. Much of the wetland vegetation would recover over time, but some wetland areas could be converted to open water. Some unavoidable impacts could occur during pipeline and other related coastal construction, but regulations are in place to avoid and minimize these impacts to the maximum extent practicable. Unavoidable impacts resulting from dredging, wake erosion, and other secondary impacts related to channel use and maintenance would occur as a result of the CPA proposed action.

Sensitive Coastal and Offshore Biological Habitats: Unavoidable adverse impacts would take place if an oil spill occurred and contacted sensitive coastal and offshore biological habitats, such as *Sargassum* at the surface; fish, turtles, and marine mammals in the water column; or benthic habitats on the bottom. There could be some adverse impacts on organisms contacted by oil, dispersant chemicals, or emulsions of dispersed oil droplets and dispersant chemicals that, at this time, are not completely understood, particularly in subsurface environments.

Water Quality: Routine offshore operations would cause some unavoidable adverse impacts to varying degrees on the quality of the surrounding water. Drilling, construction, overboard discharges of drilling mud and cuttings, and pipelaying activities would cause an increase in the turbidity of the affected waters for the duration of the activity periods. This, however, would only affect water in the immediate vicinity of the construction activity or in the vicinity of offshore structures, rigs, and platforms. The discharge of treated sewage from manned rigs and platforms would increase the levels of suspended solids, nutrients, chlorine, and biochemical oxygen demand in a small area near the discharge point for a short period of time. Accidental spills from platforms and the discharge of produced waters could result in increases of hydrocarbon levels and trace metal concentrations in the water column in the vicinity of the platforms. Spilled oil from a tanker collision would affect the water surface in combination with dispersant chemicals used during spill response. A subsurface loss of well control would subject the surface, water column, and near-bottom environment to spilled oil and gas released from solution, dispersant chemicals, or emulsions of dispersed oil droplets and dispersant chemicals.

Unavoidable impacts to onshore water quality would occur as a result of chronic point- and nonpoint-source discharges such as runoff and effluent discharges from existing onshore infrastructure used in support of lease sale activities. Vessel traffic contributes to the degradation of water quality by chronic low-quantity oil leakage, treated sanitary and domestic waste, bilge water, and contaminants known to exist in ship paints. Regulatory requirements of the State and Federal water authorities and some local jurisdictions would be applicable to point-source discharges from support facilities such as refineries and marine terminals.

Air Quality: Unavoidable short-term impacts on air quality could occur after large oil spills because of evaporation and volatilization of the lighter components of crude oil, combustion from surface burning, and aerial spraying of dispersant chemicals. Short-term effects from spill events are uncontrollable and are likely to be aggravated or mitigated by the time of year the spills take place. Mitigation of long-term effects from offshore engine combustion during routine operations would be accomplished through existing regulations and the development of new control emission technology.

Threatened and Endangered Species: Because the proposed CPA lease sale does not in and of itself make any irreversible or irretrievable commitment of resources that would foreclose the development or implementation of any reasonable and prudent measures to comply with the Endangered Species Act, BOEM may proceed with publication of this Supplemental EIS and finalize a decision among these alternatives even if consultation is not complete, consistent with Section 7(d) of the ESA (also refer to **Chapter 5.7**). Irreversible loss of individuals that are ESA-listed species may occur after a large oil spill from the acute impact of being oiled or the chronic impact of oil having eliminated, reduced, or rendered suboptimal the food species upon which they were dependent.

Nonendangered and Nonthreatened Marine Mammals: Unavoidable adverse impacts to nonendangered and nonthreatened marine mammals would be those that also affect endangered and threatened marine mammal species. Routine operation impacts (such as seismic surveys, water quality and habitat degradation, helicopter disturbance, vessel collision, and discarded trash and debris) would be negligible or minor to a population, but they could be lethal to individuals as in the case of a vessel collision. A large oil spill would temporarily degrade habitat if spilled oil, dispersant chemicals, or emulsions of dispersed oil droplets and dispersant chemicals contact free-ranging pods or spawning grounds.

Coastal and Marine Birds: Unavoidable adverse impacts from routine operations on coastal birds could result from helicopter and OCS service-vessel traffic, facility lighting, and floating trash and debris. Marine birds could be affected by noise, platform lighting, aircraft disturbances, and trash and debris associated with offshore activities. Cross-Gulf migrating species could be affected by lighted platforms, helicopter and vessel traffic, and floating trash and debris. If a large oil spill occurs and contacts coastal or marine bird habitats, some birds could experience lethal and sublethal impacts from oiling, and birds feeding or resting in the water could be oiled and die. Coastal birds coming into contact with oil may migrate more deeply into marsh habitats, out of reach from spill responders seeking to count them or collect them for rehabilitation. Oil spills and oil-spill cleanup activities could also affect the food species for coastal, marine, and migratory bird species. Depending on the time of year, large oil spills could decrease the nesting success of species that concentrate nests in coastal environments due to direct effects of the spill and also disruption from oil-spill cleanup activities.

Fish Resources, Commercial Fisheries, and Recreational Fishing: Unavoidable adverse impacts from routine operations are loss of open ocean or bottom areas desired for fishing by the presence or construction of OCS oil- and gas-related facilities and pipelines. Loss of gear could occur from bottom obstructions around platforms and subsea production systems. Routine discharges from vessels and platforms are minor given the available area for fish habitat. If a large oil spill occurs, the oil, dispersant chemicals, or emulsions of oil droplets and dispersant chemicals could temporarily displace mobile fish species on a population or local scale. There could also be impacts on prey and sublethal effects on fish. It is unlikely that fishermen would want, or be permitted, to harvest fish in the area of an oil spill, as spilled oil could coat or contaminate commercial fish species, rendering them unmarketable.

Recreational Beaches: Unavoidable adverse impacts from routine operations may result in the accidental loss overboard of some floatable debris that may eventually come ashore on frequented recreational beaches. A large oil spill could make landfall on recreational beaches, leading to local or regional economic losses and stigma effects, causing potential users to avoid the area after acute impacts have been removed. Some recreational beaches become temporarily soiled by weathered crude oil, and tarballs may come ashore long after stranded oil has been cleaned from shoreline areas.

Economic Activity: Net economic, political, and social benefits accrue from the production of hydrocarbon resources. Once these benefits become routine, unavoidable adverse impacts from routine operations follow trends in supply and demand based on the commodity prices for oil, gas, and refined hydrocarbon products. Declines in oil and gas prices can lead to activity ramp downs by operators until prices rise. A large oil spill would cause temporary increases in economic activity associated with spill-response activity. An increase in economic activity from the response to a large spill could be offset by temporary work stoppages that are associated with spill-cause investigations and would involve a transfer

or displacement of demand to different skill sets. An oil spill could also negatively impact industries such as tourism and fishing. Routine operations affected by new regulations that are incremental would not have much effect on the baseline of economic activity; however, temporary work stoppages or the introduction of several new requirements at one time, which are costly to implement, could cause a drop-off of activity as operators adjust to new expectations or use the opportunity to move resources to other basins where they have interests.

Archaeological Resources: Unavoidable adverse impacts from routine operations could lead to the loss of unique or significant archaeological information if unrecognized at the time an area is disturbed. Required archaeological surveys significantly reduce the potential for this loss by identifying potential archaeological sites prior to an interaction occurring, thereby making avoidance or mitigation of impacts possible. A large oil spill that makes landfall on or near protected archaeological landmarks could cause loss of aesthetic value, contamination of material remains, loss of radiocarbon-dating potential, direct impacts from oil-spill cleanup activities, and/or looting.

4.3. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible or irretrievable commitment of resources refers to impacts or losses to resources that cannot be reversed or recovered. Examples are when a species becomes extinct or when wetlands are permanently converted to open water. In either case, the loss is permanent.

Wetlands: An irreversible or irretrievable loss of wetlands and associated biological resources could occur if wetlands are permanently lost because of impacts caused by dredging and construction activities that displace existing wetlands or from oil spills severe enough to cause permanent die-back of vegetation and conversion to open water. Construction and emplacement of onshore pipelines in coastal wetlands displace coastal wetlands in disturbed areas that are then subject to indirect impacts like saltwater intrusion or erosion of the marsh soils along navigation channels and canals. Ongoing natural and anthropogenic processes in the coastal zone, only one of which is OCS oil- and gas-related activity, can result in direct and indirect loss of wetlands. Natural losses as a consequence of the coastal area becoming hydrologically isolated from the Mississippi River that built it, sea-level rise, and subsidence of the delta platform in the absence of new sediment added to the delta plain appear to be much more dominant processes impacting coastal wetlands.

Sensitive Nearshore and Offshore Biological Resources: An irreversible loss or degradation of ecological habitat caused by cumulative activity tends to be incremental over the short term. Irretrievable loss may not occur unless or until a critical threshold is reached. It can be difficult or impossible to identify when that threshold is, or would be, reached. Oil spills and chronic low-level pollution can injure and kill organisms at virtually all trophic levels. Mortality of individual organisms can be expected to occur, and possibly a reduction or even elimination of a few small or isolated populations. The proposed biological stipulations, however, are expected to eliminate most of these risks.

Threatened and Endangered Species: Irreversible loss of individuals that are protected species may occur after a large oil spill from the acute impact of being oiled or the chronic impact of oil having eliminated, reduced, or rendered suboptimal the food species upon which they were dependent.

Fish Resources and Commercial Fisheries: Irreversible loss of fish and coral resources, including commercial and recreational species, are caused by structure removal using explosives. Fish in proximity to an underwater explosion can be killed. Without the structure to serve as habitat area, sessile, attached invertebrates and the fish that live among them are absent. Removing structures eliminates these special and local habitats and the organisms living there, including such valuable species as red snapper. Continued structure removal, regardless of the technique used, would reduce the net benefits to commercial fishing due to the presence of these structures.

Recreational Beaches: Impacts on recreational beaches from a large oil spill may, at the time, seem irreversible, but the impacts are generally temporary. Beaches fouled by a large oil spill would be temporarily unavailable to the people who would otherwise frequent them, but only during the period between landfall and cleanup of the oil, followed by an indefinite lag period during which stigma effects recede from public consciousness.

Archaeological Resources: Irreversible loss of a prehistoric or historic archaeological resource can occur if bottom-disturbing activity takes place without the surveys, where required, to demonstrate its absence before work proceeds. A resource can be completely destroyed, severely damaged, or the

scientific context badly impaired by well drilling, subsea completions, and platform and pipeline installation, or sand borrowing.

Oil and Gas Development: Leasing and subsequent development and extraction of hydrocarbons as a result of the CPA proposed action represents an irreversible and irretrievable commitment by the removal and consumption of nonrenewable oil and gas resources. The estimated amount of resources to be recovered as a result of the CPA proposed action is presented in **Table 3-1**.

Loss of Human and Animal Life: The OCS oil and gas exploration, development, production, and transportation are carried out under comprehensive, state-of-the-art, enforced regulatory procedures designed to ensure public and work place safety and environmental protection. Nevertheless, some loss of human and animal life may be inevitable from unpredictable and unexpected acts of man and nature (i.e., unavoidable accidents, accidents caused by human negligence or misinterpretation, human error, willful noncompliance, and adverse weather conditions). Some normal and required operations, such as structure removal, can kill sea life in proximity to explosive charges or by removal of the structure that served as the framework for invertebrates living on it and the fish that lived with it.

4.4. RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The short-term effects on various components of the environment in the vicinity of the CPA proposed action are related to long-term effects and the maintenance and enhancement of long-term productivity.

Short-Term Use

Short-term refers to the total duration of oil and gas exploration and production activities. Extraction and consumption of offshore oil and natural gas is a short-term benefit. Discovering and producing domestic oil and gas now reduces the Nation's dependency on foreign imports. Depleting a nonrenewable resource now removes these domestic resources from being available for future use. The production of offshore oil and natural gas as a result of the CPA proposed action would provide short-term energy, and as it delays the increase in the Nation's dependency on foreign imports, it can also allow additional time for ramp-up and development of long-term renewable energy sources or substitutes for nonrenewable oil and gas. Economic, political, and social benefits would accrue from the availability of these natural resources.

The principle short-term use of the leased areas in the Gulf of Mexico would be for the production of 0.460-0.894 BBO and 1.939-3.903 Tcf of gas from a typical CPA proposed action. The cumulative impacts scenario in this Supplemental EIS extends approximately from 2012 to 2051. The 40-year time period is used because it is the approximate longest life span of activities conducted on an individual lease. The 40 years following the proposed CPA lease sale is the period of time during which the activities and impacting factors that follow as a consequence of the proposed CPA lease sale would be influencing the environment.

The specific impacts of the CPA proposed action vary in kind, intensity, and duration according to the activities occurring at any given time (**Chapter 3**). Initial activities, such as seismic surveying and exploration drilling, result in short-term, localized impacts. Development drilling and well workovers occur sporadically throughout the life of the CPA proposed action but also result in short-term, localized impacts. Activities during the production life of a platform may result in chronic impacts over a longer period of time (over 25 years), potentially punctuated by more severe impacts as a result of accidental events or a spill. Platform removal is also a short-term activity with localized impacts, including removal of the habitat for encrusting invertebrates and fish living among them. Many of the effects on physical, biological, and socioeconomic resources discussed in **Chapters 4.1 and 4.2** are considered to be short term (being greatest during the construction, exploration, and early production phases). These impacts would be further reduced by the mitigating measures discussed in **Chapter 2.2.2**.

The OCS oil- and gas- related development off Louisiana, Mississippi, and Alabama has enhanced recreational and commercial fishing activities, which in turn has stimulated the manufacture and sale of larger private fishing vessels and specialized recreational fishing equipment. Commercial enterprises such as charter boats have become heavily dependent on offshore structures for satisfying recreational customers. The CPA proposed action could increase these incidental benefits of offshore development. Offshore fishing and diving have gradually increased in the past three decades, with offshore structures

and platforms becoming the focus of much of that activity. As mineral resources become depleted, platform removals would occur and may result in a decline in these activities.

The short-term exploitation of hydrocarbons for the OCS Program in the Gulf of Mexico may have long-term impacts on biologically sensitive coastal and offshore resources and areas if a large oil spill occurs. A spill and spill-response activity could temporarily interfere with commercial and recreational fishing, beach use, and tourism in the area where the spill makes landfall and in a wider area based on stigma effects. The proposed leasing may also result in onshore development and population increases that could cause very short-term adverse impacts to local community infrastructure, particularly in areas of low population and minimal existing industrial infrastructure (Chapter 4.2.1.23.1 of the 2012-2017 WPA/CPA Multisale EIS and WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.23.1 of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS).

Relationship to Long-Term Productivity

Long-term refers to an indefinite period beyond the termination of oil and gas production. Over a period of time after peak oil production has occurred in the Gulf of Mexico, a gradual easing of the specific impacts caused by oil and gas exploration and production would occur as the productive reservoirs in the Gulf have been discovered and produced, and have become depleted. The Oil Drum (2009) showed a graphic demonstrating that peak oil production in the Gulf occurred in June 2002 at 1.73 MMbbl per day. Whether or not this date is correct can only be known in hindsight and only after a period of years while production continues. At this time, however, the trend is fairly convincing (The Oil Drum, 2009). There is disagreement on what future production trends may be in the Gulf of Mexico after several operators, BP among them, announced discoveries over the last 5 years (*Oil and Gas Journal*, 2009) in the Lower Tertiary in ultra-deepwater (>5,000 ft; 1,524 m) with large projected reserves. These claims are as yet unproven and there are questions as to the difficulties that may be encountered producing these prospects because of their geologic age; burial depth and high-temperature, high-pressure in-situ conditions; lateral continuity of reservoirs; and the challenges of producing from ultra-deepwater water depths.

The Gulf of Mexico's large marine ecosystem is considered a Class II, moderately productive ecosystem (mean phytoplankton primary production 150-300 g Chlorophyll *a*/m^2-yr [The Encyclopedia of Earth, 2008]) based on Sea-viewing Wide Field-of-view Sensor (SeaWiFS) global primary productivity estimates (USDOC, NASA, 2003). After the completion of oil and gas production, a gradual ramp-down to economic conditions without OCS oil- and gas-related activity would be experienced, while the marine environment is generally expected to remain at or return to its normal long-term productivity levels that, in recent years, has been described as stressed (The Encyclopedia of Earth, 2008). The Gulf of Mexico's large marine ecosystem shows signs of ecosystem stress in bays, estuaries, and coastal regions (Birkett and Rapport, 1999). There is shoreline alteration, pollutant discharge, oil and gas development, and nutrient loading. The overall condition for the U.S. section of this large marine ecosystem, according to the USEPA's seven primary indicators (Jackson et al., 2000), is good dissolved oxygen, fair water quality, poor coastal wetlands, poor eutrophic condition, and poor sediment, benthos, and fish tissue (The Encyclopedia of Earth, 2008).

To help sustain the long-term productivity of the Gulf of Mexico ecosystem, the OCS Program provides structures to use as site-specific artificial reefs and fish-attracting devices for the benefit of commercial and recreational fishermen and to sport divers and spear fishers. Additionally, the OCS Program continues to improve the knowledge and mitigation practices used in offshore development. Approximately 10 percent of the oil and gas structures removed from the OCS are eventually used for State artificial reef programs.

CHAPTER 5

CONSULTATION AND COORDINATION

5. CONSULTATION AND COORDINATION

5.1. DEVELOPMENT OF THE PROPOSED ACTION

This Supplemental EIS addresses one proposed oil and gas lease sale in the CPA (Lease Sale 247) of the Gulf of Mexico, as scheduled in the Five-Year Program (USDOI, BOEM, 2012a) (**Figure 1-1**). BOEM conducted early coordination with appropriate Federal and State agencies and other concerned parties to discuss and coordinate the prelease process for the proposed lease sale and this Supplemental EIS. Key agencies and organizations included the National Oceanic and Atmospheric Administration, NOAA's National Marine Fisheries Service, FWS, National Park Service, U.S. Coast Guard, U.S. Department of Defense, USEPA, State Governors' offices, Tribal Nations, nongovernmental organizations, and industry groups.

5.2. CALL FOR INFORMATION AND NOTICE OF INTENT TO PREPARE A SUPPLEMENTAL EIS

On July 9, 2012, the Call for Information (Call) for proposed CPA Lease Sales 231, 235, 241, and 247 was published in the *Federal Register* (2012a). The 30-day comment period closed on August 8, 2012. BOEM received two comment letters in response to the Call. These comments are summarized below in **Chapter 5.3.1**.

On August 17, 2015, the Notice of Intent to Prepare a Supplemental EIS (NOI) for proposed CPA Lease Sale 247 was published in the *Federal Register*. Additional public notices were distributed via local newspapers, the U.S. Postal Service, and the Internet. The 30-day comment period for the NOI closed on September 16, 2015. Federal, State, and local governments, Tribal Nations, nongovernmental organizations, and other interested parties were invited to send written comments to the Gulf of Mexico OCS Region on the scope of the Supplemental EIS. BOEM received one comment letter, three emails, and one submission to www.regulations.gov in response to the NOI. The comments that the National Park Service provided by letter and email were the same. These comments are summarized below in **Chapter 5.3.2**.

5.3. DEVELOPMENT OF THE DRAFT SUPPLEMENTAL EIS

Scoping for the Draft Supplemental EIS was conducted in accordance with CEQ regulations for implementing NEPA. Scoping provides those with an interest in the OCS Program an opportunity to provide comments on the proposed action. In addition, scoping provides BOEM an opportunity to update the Gulf of Mexico OCS Region's environmental and socioeconomic information base. Public scoping meetings were held in Alabama, Mississippi, and Louisiana on the following dates and at the times and locations indicated below:

Tuesday, September 1, 2015	Wednesday, September 2, 2015
4:00 p.m. CDT	6:00 p.m. CDT
Hilton Garden Inn Mobile West	Courtyard Marriott, Gulfport Beachfront
828 West I-65 Service Road South	1600 East Beach Boulevard
Mobile, Alabama 36609	Gulfport, Mississippi 39501
3 registered attendees	0 registered attendees
1 speaker	0 speakers

Thursday, September 3, 2015
1:00 p.m. CDT
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, Louisiana 70123
4 registered attendees
1 speaker

5.3.1. Summary of Comments Received in Response to the Calls for Information

In response to the Call for proposed CPA Lease Sales 231, 235, 241, and 247, BOEM received two comment letters: one letter from the Louisiana Department of Natural Resources and one letter from the American Petroleum Institute (API). The Louisiana Department of Natural Resources hopes that BOEM will be more attentive to the State of Louisiana's comments during the prelease planning phase, believes that a better appraisal of coastal effects is necessary, and believes that BOEM must more efficiently revisit reviews of earlier OCS lease sales to determine whether the models and predictive techniques used were accurate. The API states that annual, predictable lease sales in these planning areas are needed to help ensure continued offshore exploration and production in the future because production from lease sales will take many years to develop. The API further encourages BOEM to pursue legislation that will allow the entry into force of the "Agreement between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico" (Agreement). This Agreement, which was signed after issuance of the Call and entered into force on July 18, 2014, governs the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico.

5.3.2. Summary of Scoping Comments

Comments (both verbal and written) were received from the NOI and three scoping meetings from Federal and State government agencies; interest groups; industry; businesses; and the general public on the scope of this Supplemental EIS, significant issues that should be addressed, alternatives that should be considered, and mitigating measures. All scoping comments received, which were appropriate for a lease sale NEPA document, were considered in the preparation of the Draft Supplemental EIS. BOEM received one comment letter via mail on the NOI, three comments via email, and one comment via www.regulations.gov during the scoping process. The comments that the National Park Service provided by letter and email were the same. A total of two speakers provided comments at the three scoping meetings. The following is a summary of the comments that were provided during the scoping process.

U.S. Department of the Interior, National Park Service (letter and email dated September 15, 2015)

- The National Park Service (NPS) accepts the invitation to become a cooperating agency in developing the Supplemental EIS. General comments from the NPS emphasized NPS's authority for managing the islands and surrounding waterbottoms, the designation of Horn and Petit Bois Islands as wilderness, and additional authorizations that the NPS has been given to protect and manage the Gulf Islands National Seashore (GUIS).
- Comments from the NPS had three overarching recommendations: (1) develop an alternative that excludes lease sales within 15 mi (24 km) of the GUIS; (2) add an NPS consultation stipulation to alternatives that include lease sales within 15 mi (24 km) of the GUIS; and (3) undertake a robust environmental analysis that acknowledges the scenic and wilderness character of the GUIS.
- The NPS also included six specific comments: (1) a request that the Supplemental EIS analyze the potential for subsidence at the barrier islands of the GUIS as a result of oil and gas drilling; (2) an analysis of the direct and adverse effects to natural

resources, including wildlife, of the GUIS from routine OCS oil- and gas-related operations; (3) an analysis of water quality and natural resource impacts from incidental oil or chemical spills and an offer to participate in the development of a spill prevention plan; (4) a request for more studies to be included in this Supplemental EIS, i.e., studies that quantify the potential adverse visual impacts to the GUIS, and an offer to develop standard lighting design feature requirements and conduct a visual impact analysis; (5) a request that this Supplemental EIS analyze the degradation of aesthetics and the wilderness character of Horn and Petit Bois Islands; and (6) a request that this Supplemental EIS include appropriate surveys and analysis of the potential impacts on any sensitive maritime archaeological resources in the project area.

Louisiana Department of Natural Resources, Office of Coastal Management (email dated September 15, 2014)

- The Louisiana Office of Coastal Management recommends that BOEM exert greater effort to quantify all secondary, indirect, and cumulative losses to their coastal zone from offshore energy development and a plan for compensatory mitigation.
- The State of Louisiana supports exploration and development while acknowledging that the continued support of these activities is tied to the resiliency of the coast and coastal communities.

American Petroleum Institute (email dated September 15, 2015)

- The API supports analysis of the environmental and socioeconomic impacts associated with development activities stemming from upcoming lease sales and the timely preparation of this Supplemental EIS.
- BOEM must focus EIS analyses on currently available new information and should not speculate on future results from ongoing studies.
- BOEM should also take into consideration the new safety and regulatory improvements since the *Deepwater Horizon* explosion, oil spill, and response as a part of the new information analyzed.
- The API suggests that this Supplemental EIS be designed specifically for use as a tiering document for future environmental reviews and that data from the best-available, peer-reviewed scientific literature should be the basis of environmental analyses, and not speculation.

General Public (comment via www.regulations.gov dated August 21, 2015)

- The general public recommended that the proposed lease sale be cancelled because of concerns over pollution.

Verbal Comments Received at the Scoping Meetings

- Operation Home Care raised concerns about the proposed lease sale due to potential future and ongoing human health and fisheries impacts, which the commenter tied to the *Deepwater Horizon* explosion, oil spill, and response. The commenter also raised concerns about Agency oversight, regulation, and monitoring of oil- and gas-related activities.
- The Acadian Group of the Sierra Club raised concerns about a series of issues, including pipeline safety in coastal Louisiana, potential pollution impacts from crew and supply support-vessel discharges to coastal and offshore fisheries resources, the

State/Federal revenue sharing for revenues generated on OCS lands, and the environmental impacts of produced waters and drilling wastes. In addition, the Acadian Group of the Sierra Club recommended that a monitoring system that incorporates the use of offshore buoys be installed to track oil movement in the event of future large offshore spills.

5.3.3. Additional Scoping Opportunities

Although the scoping process is formally initiated by the publication of the NOI and Call, scoping efforts and other coordination meetings have proceeded and will continue to proceed throughout the NEPA processes. Scoping and coordination opportunities were also available during BOEM's requests for information, comments, input, and review of its other NEPA documents, including the following:

- scoping and comments on the 2012-2017 Five-Year Program EIS;
- scoping and comments on the 2012-2017 WPA/CPA Multisale EIS;
- scoping and comments on the WPA 233/CPA 231 Supplemental EIS;
- scoping and comments on the CPA 235/241/247 Supplemental EIS; and
- scoping and comments on the CPA 241/247 and EPA 226 Supplemental EIS.

5.3.4. Cooperating Agency

According to Part 516 of the DOI Departmental Manual, BOEM must invite eligible governmental entities to participate as cooperating agencies when developing an EIS in accordance with the requirements of NEPA and CEQ regulations. BOEM must also consider any requests by eligible government entities to participate as a cooperating agency with respect to a particular EIS, and then to either accept or deny such requests.

The NOI, which was published on August 17, 2015, included an invitation to other Federal agencies and State, Tribal, and local governments to consider becoming cooperating agencies in the preparation of this Supplemental EIS. In addition to this invitation, BOEM issued a letter to NPS inquiring if they would like to be a cooperating agency on this Supplemental EIS. This request was sent as a courtesy since NPS participated as a cooperating agency on the CPA 241/247 and EPA 226 Supplemental EIS. By their email and letter dated September 15, 2015, the NPS confirmed their interest to participate as a cooperating agency.

BOEM has reviewed CEQ implementing regulations of NEPA specific to cooperating agencies. The CEQ regulation sets two criteria for which agencies may be cooperating agencies:

(1) jurisdiction by law (40 CFR § 1508.15) – for example, agencies with the authority to grant permits for implementing the action; or

(2) special expertise (40 CFR § 1508.26) – cooperating agency status for specific purposes linked to special expertise requires more than an interest in a proposed action (Federal and non-Federal agencies <u>may</u> be requested [40 CFR §§ 1501.6 and 1508.5]).

While the GUIS is not within the jurisdictional authority of BOEM, nor does NPS have jurisdictional authority for the OCS or OCS-related actions, NPS identified their special expertise regarding the resources and the values of the GUIS and the surrounding areas. The NPS indicated that their participation was to ensure that pertinent NPS mission statements, legislative authorities, and policies are duly considered when developing any alternatives related to management action or options that could potentially affect units of NPS. BOEM has engaged in a deliberative process to evaluate this request and determine if the cooperating agency will provide additional analysis or data that BOEM does not already have.

BOEM has entered into a Memorandum of Agreement (MOA) with NPS to establish expectations between the two agencies that apply for the duration of this Supplemental EIS, whereupon it terminates.

This MOA outlines the responsibilities agreed to by BOEM and NPS for this Supplemental EIS project. A copy of the MOA is provided in **Appendix A**. BOEM provided NPS the opportunity to respond and provide any additional objective and analytical information to be included in the Draft Supplemental EIS. BOEM has incorporated revisions to this Final Supplemental EIS to respond to additional objective and analytical information provided by the NPS during the Draft Supplemental EIS comment period.

5.4. DISTRIBUTION OF THE DRAFT SUPPLEMENTAL EIS FOR REVIEW AND COMMENT

BOEM sent copies of the Draft Supplemental EIS to the government, public, and private agencies and groups listed below. Local libraries along the Gulf Coast were provided copies of this Supplemental EIS; a list of these libraries is available on BOEM's Internet website at http://www.boem.gov/nepaprocess/.

Federal Agencies

Congress
- Congressional Budget Office
- House of Representatives
- House Resources Subcommittee on Energy and Mineral Resources
- Senate Committee on Energy and Natural Resources

Department of Commerce
- National Marine Fisheries Service
- National Oceanic and Atmospheric Administration

Department of Defense
- Department of the Air Force
- Department of the Army
- Corps of Engineers
- Department of the Navy
- Naval Mine and ASW Command

Department of Energy
- Strategic Petroleum Reserve PMD

Department of Homeland Security
- Coast Guard

Department of State
- Bureau of Oceans and International Environmental and Scientific Affairs

Department of the Interior
- Bureau of Ocean Energy Management
- Bureau of Safety and Environmental Enforcement
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Office of Environmental Policy and Compliance
- Office of the Solicitor

Department of Transportation
- Office of Pipeline Safety

Environmental Protection Agency
- Region 4
- Region 6

Marine Mammal Commission

National Aeronautics and Space Administration

State and Local Agencies

Alabama
- Governor's Office
- Alabama Highway Department
- Alabama Historical Commission and State Historic Preservation Officer
- Alabama Public Library Service
- Alabama Public Service Commission
- City of Mobile
- City of Montgomery
- Department of Conservation and Natural Resources
- Department of Environmental Management
- Geological Survey of Alabama
- South Alabama Regional Planning Commission
- State Legislature Natural Resources Committee
- Town of Dauphin Island

Florida
- Governor's Office
- Bay County
- Citrus County
- City of Destin
- City of Fort Walton Beach
- City of Gulf Breeze
- City of Panama City
- City of Pensacola
- Department of Agriculture and Consumer Services
- Department of Environmental Protection
- Department of State Archives, History and Records Management
- Escambia County
- Florida Emergency Response Commission
- Florida Fish and Wildlife Conservation Commission

Franklin County
Gulf County
Hernando County
Hillsborough City-County Planning Commission
Lee County
Monroe County
North Central Florida Regional Planning Council
Okaloosa County
Pasco County
Santa Rosa County
Sarasota County
Southwest Florida Regional Planning Council
State Legislature Agriculture and Natural Resources Committee
Tampa Bay Regional Planning Council
Walton County
West Florida Regional Planning Council
Withlacoochee Regional Planning Council

Louisiana
Governor's Office
Calcasieu Parish
Cameron Parish
City of Lake Charles
City of Morgan City
City of New Orleans
Department of Culture, Recreation, and Tourism
Department of Economic Development
Department of Environmental Quality
Department of Natural Resources
Department of Transportation and Development
Department of Wildlife and Fisheries
Jefferson Parish
Lafourche Parish
Louisiana Geological Survey
South Lafourche Levee District
St. Bernard Parish
State House of Representatives, Natural Resources Committee
State Legislature Natural Resources Committee
State of Louisiana Library
Terrebonne Parish
Town of Grand Isle

Mississippi
Governor's Office
City of Bay St. Louis
City of Gulfport
City of Pascagoula
Department of Archives and History
Department of Environmental Quality
Department of Marine Resources
Department of Wildlife, Fisheries, and Parks
Jackson-George Regional Library System
Mississippi Development Authority
State Legislature Oil, Gas, and Other Minerals Committee

Federally Recognized Indian Tribes

Alabama-Coushatta Tribe of Texas
Caddo Nation
Chitimacha Tribe of Louisiana
Choctaw Nation of Oklahoma
Coushatta Tribe of Louisiana
Jena Band of Choctaw Indians
Kickapoo Traditional Tribe of Texas
Miccosukee Tribe of Indians of Florida
Mississippi Band of Choctaw Indians
Poarch Band of Creek Indians
Seminole Tribe of Florida
Seminole Nation of Oklahoma
Tunica-Biloxi Indian Tribe of Louisiana

Industry

Adams and Reese, LLP
Alabama Petroleum Council
American Petroleum Institute
Applied Technology Research Corporation
Associated Gas Distributors of Florida
Baker Energy
Bepco, Inc.
C.H. Fenstermaker & Associates, Inc.
Century Exploration N.O., Inc.
Chet Morrison Contractors
Chevron U.S.A. Inc.
C-K Associates, LLC
Coastal Environments, Inc.
Columbia Gulf Transmission
CSA International
De Leon & Associates
Ecological Associates, Inc.
Ecosystem Management, Inc.
Energy Partners, Ltd.
Florida Natural Gas Association
Florida Petroleum Council
Florida Power and Light
Florida Propane Gas Association
Freeport-McMoRan, Inc.
General Insulation, Inc.
Global Industries, Ltd.
Halliburton Corporation
Han & Associates, Inc.
Horizon Marine, Inc.

John Chance Land Surveys, Inc.
L&M Botruc Rental, Inc.
Lampl Herbert Consultants
Larose Intercoastal Lands, Inc.
Linder Oil Company
Louisiana Oil and Gas Association
Magnum Steel Services Corp.
Mid Continent Oil and Gas Association
Nature's Way Marine, LLC
Offshore Process Services, Inc.
Oil and Gas Property Management, Inc.
Phoenix International Holdings, Inc.
Project Consulting Services
R.B. Falcon Drilling
Raintree Resources, Inc.
Science Applications International Corporation
SEOT, Inc.
Shell Offshore, Inc.
Stone Energy Corporation
Strategic Management Services-USA
T. Baker Smith, Inc.
The SJI, LLC
The Times-Picayune
URS Corporation
Waring & Associates

Special Interest Groups

1000 Friends of Florida
Alabama Oil & Gas Board
Alabama Nature Conservancy
Alabama Wildlife Federation
Apalachee Regional Planning Council
Apalachicola Bay and Riverkeepers
Audubon Louisiana Nature Center
Audubon of Florida
Barataria-Terrebonne National Estuary Program
Bay County Chamber of Commerce
Bay Defense Alliance
Citizens Assoc. of Bonita Beach
Clean Gulf Associates
Coalition to Restore Coastal Louisiana
Concerned Shrimpers of America
Conservancy of Southwest Florida
Earthjustice
Florida Chamber of Commerce
Florida Natural Area Inventory
Florida Wildlife Federation
Gulf and South Atlantic Fisheries Foundation, Inc.
Gulf Coast Environmental Defense
Gulf Coast Fisherman's Coalition
Gulf Restoration Network
Houma-Terrebonne Chamber of Commerce
Izaak Walton League of America, Inc.
LA 1 Coalition, Inc.
League of Women Voters of the Pensacola Bay Area
Louisiana Wildlife Federation
Manasota-88
Mobile Bay National Estuary Program
Offshore Operators Committee
Organized Fishermen of Florida
Panama City Beach Convention and Visitors Bureau
Pensacola Archaeological Society
Perdido Key Association
Perdido Key Chamber of Commerce
Perdido Watershed Alliance
Restore or Retreat
Roffers Ocean Fishing Forecast Service
Santa Rosa Sound Coalition
Save the Manatee Club
Sierra Club
South Central Industrial Association
Surfrider Foundation
The Ocean Conservancy
The Nature Conservancy

Ports/Docks

Alabama
- Alabama State Port Authority
- Port of Mobile

Florida
- Manatee County Port Authority
- Panama City Port Authority
- Port of Pensacola
- Port St. Joe Port Authority
- Tampa Port Authority

Louisiana
- Abbeville Harbor and Terminal District
- Greater Baton Rouge Port Commission
- Greater Lafourche Port Commission
- Grand Isle Port Commission
- Lake Charles Harbor and Terminal District
- Port of Iberia District
- Port of New Orleans
- St. Bernard Port, Harbor and Terminal District
- West Cameron Port Commission

Mississippi
- Mississippi State Port Authority

Educational Institutions/Research Laboratories

Dauphin Island Sea Laboratory
Florida A&M University
Florida Institute of Oceanography
Florida Institute of Technology
Florida Sea Grant College
Florida State University
Foley Elementary School
Gulf Coast Research Laboratory
Gulf Coast State College
Harbor Branch Oceanography
Louisiana Sea Grant College Program
Louisiana State University
Louisiana Tech University
Louisiana Universities Marine Consortium
Loyola University
McNeese State University
Mississippi State University
Mississippi-Alabama Sea Grant Consortium
Mote Marine Laboratory
Nicholls State University
Pensacola Junior College
Tulane University
University of Alabama
University of Florida
University of Louisiana at Lafayette
University of Miami
University of Mississippi
University of New Orleans
University of South Alabama
University of South Florida
University of Southern Mississippi
University of West Florida

5.5. PUBLIC MEETINGS

In accordance with 30 CFR § 556.26, BOEM scheduled public meetings soliciting comments on the Draft Supplemental EIS. The meetings were conducted to solicit information from interested parties in order to provide the Secretary of the Interior with information to help in the evaluation of the potential effects of the proposed CPA lease sale. An announcement of the dates, times, and locations of the public meetings was including in the Notice of Availability of the Draft Supplemental EIS. A copy of the public meeting notices was included with the Draft Supplemental EIS that was mailed to the parties indicated above, was published in local newspapers, and was posted on BOEM's website at http://www.boem.gov/nepaprocess/.

The public meetings were held on the following dates and at the times and locations indicated below:

Monday, March 14, 2016
6:00 p.m. CDT
Courtyard Marriott, Gulfport Beachfront
1600 East Beach Boulevard
Gulfport, Mississippi 39501
0 registered attendees
0 speakers
0 written comments received

Tuesday, March 15, 2016
4:00 p.m. CDT
Hilton Garden Inn Mobile West
828 West I-65 Service Road South
Mobile, Alabama 36609
1 registered attendee
0 speakers
0 written comments received

Thursday, March 17, 2016
1:00 p.m. CDT
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, Louisiana 70123
5 registered attendees
2 speakers
1 written comment received

New Orleans, Louisiana, March 17, 2016

Ms. Monique Verdin, Gulf Coast Liaison, Indigenous Environmental Network

Ms. Verdin stated a preference for Alternative C and for no new leases in the Gulf of Mexico.

Ms. Anne Rolfes, Founding Director, Louisiana Bucket Brigade

Ms. Rolfes stated a preference for no new leases in the Gulf of Mexico and for the cancellation of the upcoming lease sale on March 23, 2016.

5.6. COASTAL ZONE MANAGEMENT ACT

If a Federal agency's activities or development projects within or outside of the coastal zone will have reasonably foreseeable coastal effects in the coastal zone, then the activity is subject to a Federal Consistency Determination (CD). A consistency review will be performed pursuant to the Coastal Zone Management Act (CZMA), and CDs will be prepared for each CZMA State prior to the proposed lease sale. To prepare the CDs, BOEM reviews each CZMA State's Coastal Management Plan and analyzes the potential impacts as outlined in this Supplemental EIS, new information, and applicable studies as they pertain to the enforceable policies of each Coastal Management Program (CMP). The CZMA requires that Federal actions that are reasonably likely to affect any land or water use or natural resource of the coastal zone be "consistent to the maximum extent practicable" with relevant enforceable policies of the State's federally approved coastal management program (15 CFR part 930 subpart C).

Based on these and other analyses, BOEM's Gulf of Mexico OCS Region's Regional Director makes an assessment of consistency, which is then sent to the CZMA States of Texas and Louisiana for proposed WPA lease sales or to Louisiana, Mississippi, Alabama, and Florida for proposed CPA and/or EPA lease sales. If a CZMA State concurs, BOEM can proceed with the proposed lease sale. A CZMA State's concurrence may be presumed when a CZMA State does not provide a response within the 60-day review period. A CZMA State may request an extension of time to review the CD within the 60-day period, which the Federal agency shall approve for an extension of 15 days or less. If a CZMA State objects, it must do the following under the CZMA:

(1) indicate how BOEM's prelease proposal is inconsistent with the State's CMP and suggest alternative measures to bring BOEM's proposal into consistency with the State's CMP; or

(2) describe the need for additional information that would allow a determination of consistency. In the event of an objection, the Federal and State agencies should use the remaining portion of the 90-day review period to attempt to resolve their differences (15 CFR § 930.43(b)).

At the end of the 90-day review period, the Federal agency shall not proceed with the activity over a CZMA State agency's objection unless the Federal agency concludes that, under the "consistent to the maximum extent practicable" standard described in 15 CFR § 930.32, consistency with the enforceable policies of the CMP is prohibited by existing law applicable to the Federal agency and the Federal agency has clearly described, in writing, to the State agency the legal impediments to full consistency; or, the Federal agency has concluded that its proposed action is fully consistent with the enforceable policies of the CMP, though the CZMA State agency objects. Unlike the consistency process for specific OCS plans and permits, there is no procedure for administrative appeal to the Secretary of Commerce for a Federal CD for prelease activities. In the event that there is a serious disagreement between BOEM and a CZMA State, either agency may request mediation. Mediation is voluntary, and the Secretary of Commerce would serve as the mediator. Whether there is mediation or not, the final CD is made by DOI, and it is the final administrative action for the prelease consistency process. Each Gulf State's CMP is described in Appendix F of the 2012-2017 WPA/CPA Multisale EIS.

5.7. ENDANGERED SPECIES ACT

The Endangered Species Act of 1973 (16 U.S.C. §§ 1531 *et seq.*), as amended, establishes a national policy designed to protect and conserve threatened and endangered species and the ecosystems upon which they depend. BOEM and BSEE are currently in consultation with NMFS and FWS regarding the OCS oil and gas program in the Gulf of Mexico. BOEM is acting as the lead agency in the ongoing consultation, with BSEE's assistance and involvement. The programmatic consultation was expanded in

scope after the reinitiation of consultation by BOEM following the *Deepwater Horizon* explosion and oil spill, and it will include both existing and future OCS oil and gas leases in the Gulf of Mexico over a 10-year period. This consultation also considers any changes in baseline environmental conditions following the *Deepwater Horizon* explosion, oil spill, and response. The programmatic consultation will also include postlease activities associated with OCS oil- and gas-related activities in the Gulf of Mexico, including G&G and decommissioning activities. While the programmatic Biological Opinion is in development, BOEM and NMFS have agreed to interim consultations on postlease approvals.

With consultation ongoing, BOEM and BSEE will continue to comply with all reasonable and prudent measures and the terms and conditions under the existing consultations, along with implementing the current BOEM- and BSEE-required mitigation, monitoring, and reporting requirements. Based on the most recent and best available information at the time, BOEM and BSEE will also continue to closely evaluate and assess risks to listed species and designated critical habitat in upcoming environmental compliance documentation under NEPA and other statutes.

5.8. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

Pursuant to Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, Federal agencies are required to consult with NMFS on any action that may result in adverse effects to EFH. The NMFS published the final rule implementing the EFH provisions of the Magnuson-Stevens Fisheries Conservation and Management Act (50 CFR part 600) on January 17, 2002. Certain OCS oil- and gas-related activities authorized by BOEM may result in adverse effects to EFH, and therefore, require EFH consultation.

Following the *Deepwater Horizon* explosion, oil spill, and response, NMFS requested a comprehensive review of the existing EFH consultation in a response letter dated September 24, 2010. In light of this request, Regional staff of BOEM and NMFS agreed on procedures that would incorporate a new programmatic EFH consultation into each prepared Five-Year Program EIS and that began with the 2012-2017 Five-Year Program. BOEM has EFH Assessments for all planning areas in the GOM (Appendix D of the 2012-2017 WPA/CPA Multisale EIS and EPA 225/226 EIS) that describe the OCS proposed activities, analyzes the effects of the proposed activities on EFH, and identifies the proposed mitigating measures. The programmatic EFH consultation, which covers proposed CPA Lease Sale 247, was initiated with the distribution and review of the 2012-2017 WPA/CPA Multisale EIS and with the subsequent written communications between BOEM and the NMFS. These documents formalized the conservation recommendations put forth by NMFS and by BOEM's acceptance and response to these recommendations.

While the necessary components of the EFH consultation are complete (as per BOEM's June 8, 2012, response letter to NMFS), there is ongoing coordination among NMFS, BOEM, and BSEE. This coordination includes annual reports from BOEM to NMFS, meetings with Regional staff, and discussions of mitigation and relevant topics. All agencies will continue to communicate for the duration of the Five-Year Program.

5.9. NATIONAL HISTORIC PRESERVATION ACT

In accordance with the National Historic Preservation Act (54 U.S.C. §§ 300101 *et seq.*), Federal agencies are required to consider the effect of their undertakings on historic properties. The implementing regulations for Section 106 of the National Historic Preservation Act (54 U.S.C. §§ 300101 *et seq.*), issued by the Advisory Council on Historic Preservation (36 CFR part 800), specify the required review process. Because of the extensive geographic area analyzed in this Supplemental EIS and because there will be no adverse effects to historic properties as a result of the proposed CPA lease sale, BOEM will complete its Section 106 review process once BOEM has performed the necessary site-specific analysis of postlease permitted or approved activities. Additional consultations with the Advisory Council on Historic Places, State historic preservation offices, federally recognized Indian Tribes, and other consulting parties may take place at that time, if appropriate. Refer to **Chapter 4.1.1.22** for more information on this review process.

As an early planning effort, BOEM initiated a request for comment on the NOI for proposed CPA Lease Sale 247 via formal letters on August 14, 2015. Those letters were addressed to each of the affected Gulf Coast States (i.e., Louisiana, Mississippi, Alabama, and Florida). A 30-day comment

period was provided and no responses were received. A second formal letter was sent to the States requesting comment on the NOA for the Draft CPA 247 Supplemental EIS on February 16, 2016. The Alabama Historical Commission responded via a letter dated March 25, 2016, requesting consultation on any proposed actions that would disturb the sea bottom within Alabama coastal waters.

A separate letter initiating a request to determine interest in participation for the Supplemental EIS was sent to the federally recognized Indian Tribes on January 22, 2016, including the Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Miccosukee Tribe of Indians of Florida, Mississippi Band of Choctaw Indians, Poarch Band of Creek Indians, Seminole Tribe of Florida, Seminole Nation of Oklahoma, and Tunica-Biloxi Indian Tribe of Louisiana. As of the publication of this Supplemental EIS, no responses have been received; however, federally recognized Tribes are not bound by public comment deadlines, and their input will be considered throughout the development process of this Supplemental EIS.

BOEM will also continue to impose mitigating measures and monitoring and reporting requirements to ensure that historic properties are not affected by the proposed undertakings. BOEM will reinitiate the consultation process with the affected parties should such circumstances warrant further consultation.

In 1977, the Historic Preservation Fund (54 U.S.C. §§ 303101-303103) was established to assist State and Tribal Historic Preservation Officers in their efforts to protect and preserve historic properties as set forth in the requirements of the National Historic Preservation Act. The Historic Preservation Fund is authorized at $150 million per year and is fully funded from OCS oil and gas revenues payable to the United States under Section 9 of the Outer Continental Shelf Lands Act (43 U.S.C. § 1338). However, these funds are available for expenditure only when appropriated by Congress, which has never fully appropriated the available funds. Since its inception, approximately $3.3 billion of the Historic Preservation Fund remains unappropriated (National Conference of State Historic Preservation Officers, 2015). The Historic Preservation Fund expired on September 30, 2015, and has not yet received Congressional reauthorization for FY 2017.

The Historic Preservation Fund may be used directly by State Historic Preservation Officers/Tribal Historic Preservation Officers or passed on as subgrants and contracts to public and private agencies, nonprofit organizations, educational institutions, and individuals. Eligible preservation projects include historic properties' survey and inventory, National Register of Historic Places' nominations, preservation education, architectural planning, historic structure reports, community preservation planning, and brick and mortar repairs to buildings (USDOI, NPS, 2014). These historic preservation programs can further catalyze community and neighborhood revitalization, job creation, and economic development, primarily through heritage tourism and the rehabilitation of historic properties through the Historic Tax Credit, which is administered by the State Historic Preservation Officers. Since the Historic Preservation Fund was implemented in 1977, the Historic Tax Credit program has rehabilitated nearly 39,000 buildings nationwide, has created 2.4 million jobs, has created 140,000 low- and moderate-income housing units, and has leveraged $109 billion in non-Federal investment (National Conference of State Historic Preservation Officers, 2014; USDOI, NPS, 2014). In Fiscal Year 2015, Congress allocated a total of $56.41 million from the Historic Preservation Fund, of which $46.925 million was awarded to State Historic Preservation Officers and $8.985 million was awarded to Tribal Historic Preservation Officers. An additional $500,000 was awarded for projects that will increase diversity in the National Register of Historic Places and the National Historic Landmarks programs (National Conference of State Historic Preservation Officers, 2015).

5.10. GOVERNMENT-TO-GOVERNMENT

In accordance with Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments," Federal agencies are required to establish regular and meaningful consultation and collaboration with Tribal officials in the development of Federal policies that have Tribal implications, to strengthen the United States' government-to-government relationships with Indian Tribes, and to reduce the imposition of unfunded mandates upon Indian Tribes. On January 22, 2016, BOEM initiated a request to determine interest in participation for this Supplemental EIS via a formal letter. That letter was addressed to each of the federally recognized Indian Tribes having Gulf Coast affiliation, including the Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Miccosukee Tribe of

Indians of Florida, Mississippi Band of Choctaw Indians, Poarch Band of Creek Indians, Seminole Tribe of Florida, Seminole Nation of Oklahoma, and Tunica-Biloxi Indian Tribe of Louisiana. On May 19, 2016, a letter was addressed to the same Tribes, further inviting consultation on the Draft CPA 247 Supplemental EIS and Final WPA 248 Supplemental EIS, which are the final two proposed lease sales to be held under the 2012-2017 Five-Year Program. As of the publication of this Supplemental EIS, no responses have been received; however, federally recognized Tribes are not bound by public comment deadlines, and their input will be considered throughout the development process of this Supplemental EIS.

5.11. Major Differences Between the Draft and Final Supplemental EISs

Comments on the Draft Supplemental EIS were received via verbal, written, and electronic correspondence. As a result of these comments, changes have been made between the Draft and Final Supplemental EISs. Where appropriate, the text in this Final Supplemental EIS has been verified or expanded to provide clarification on specific issues, as well as to provide updated information. None of the revisions made between the Draft and Final Supplemental EISs changed the impact conclusion for the physical, environmental, and socioeconomic resources analyzed in this Supplemental EIS.

5.12. Comments Received on the Draft Supplemental EIS and BOEM's Responses

The NOA and the announcement of public meeting were published in the *Federal Register* on February 26, 2016; were posted on BOEM's website; and were mailed to interested parties. The comment period ended on April 11, 2016. BOEM received 51 distinct comments in response to the Draft Supplemental EIS via letter, email, written and verbal comments at public meetings, and the regulations.gov website.

Federal Agencies

Department of the Interior
- National Park Service

Environmental Protection Agency
- Region 4

State and Local Agencies

Alabama
- Alabama Department of Environmental Management
- Alabama Historical Commission

Louisiana
- Office of the Governor
- Louisiana Department of Natural Resources

Mississippi
- City of Pascagoula, Public Relations Office

Special Interest Groups

- American Petroleum Institute
- Center for Biological Diversity
- Center for Biological Diversity and 31 additional organizations and individuals
- Colchester Creek
- Earth Ethics, Inc.
- Indigenous Environmental Network
- Kairos Center for Religions, Rights, and Social Justice
- Louisiana Bucket Brigade
- ManaSota – 88

Public

- Johnny Ardis
- Marta Badon
- Shailly Barnes
- David Begley
- Scott Bryant
- Jeff Cobb
- Andrew Collins
- Alicia Cooke
- Benjamin Craft-Rendon
- Mary DiFelici
- Carmen Druke
- Connie Eisele
- Y Ferg
- Elliot Figman
- John Foisy

Renuka Gogu
Renate Heurich
Terri Holley
Charon Hribar
Alec Johnson
Daniel Jones
Blake Kopcho
Jack Neff
Mary Nicol
Michael Rimes
Cynthia Scott
Terra Shute
Ramsey Sprague
Aly Tharp
Margie Vicknair-Pray
Heidi Vierthaler
Kevin Ward
J. Marie Weldon
LaVonne Whelchel
Charlotte Wilcox
Betty Wilson
Michael York

One comment was received after the comment period closed; the comment was addressed and is included in the list above.

Copies of the comments and responses are presented on the subsequent pages. Each comment has been marked for identification purposes. BOEM's responses immediately follow the comments.

United States Department of the Interior

National Park Service
Gulf Islands National Seashore
1801 Gulf Breeze Parkway
Gulf Breeze, Florida 32563

IN REPLY REFER TO:

L7617 (GUIS)

April 6, 2016

Gary D. Goeke
Bureau of Ocean Energy Management
1201 Elmwood Park Blvd., (MS GM623E)
New Orleans, LA 70123-2394

Dear Mr. Goeke:

The National Park Service (NPS) thanks the Bureau of Ocean Energy Management (BOEM) for allowing us to be a cooperating agency for the preparation of the Supplemental Environmental Impact Statement (SEIS) for proposed Gulf of Mexico Outer Continental Shelf (OCS) oil and gas Central Planning Area (CPA) Lease Sale 247. We believe our special expertise regarding the resources and values of Gulf Islands National Seashore (GUIS) can help BOEM strengthen its environmental review.

GUIS was authorized by Congress in 1971 (P.L. 91-660, 84 Stat. 1967, 16 U.S.C. 459h) "…to preserve for public use and enjoyment certain areas possessing outstanding natural, historic, and recreational values." As part of the coastal barrier island system, the gulf islands are among the last surviving portions of a natural ecological continuum that once extended from Cape Cod to Mexico. Due to their untrammeled and pristine character, GUIS's stunning barrier islands attracted approximately four and a half million visitors in 2014, with one of the primary attractions being able to enjoy comparatively unencumbered scenic views of the Gulf of Mexico.

NPS-1

The NPS continues to be highly concerned that this upcoming lease sale could allow offshore oil and gas development on OCS blocks located as close as three miles from Horn and Petit Bois Islands, which are congressionally designated wilderness and treasured destinations for park visitors. While we greatly appreciate BOEM's development of an Information to Lessees (ITL), and assurances that development on the OCS near GUIS is unlikely, it does not diminish our concern that such development may still occur. As stated in previous letters, we believe that BOEM should exclude future leasing of unleased blocks within 15 miles of GUIS. Thus, we continue to encourage BOEM to include an alternative in the Draft SEIS that excludes unleased blocks within 15 miles of GUIS. This would specifically impact CPA lease blocks numbered: 810 through 825; 854 through 869; and 899 through 913.

The NPS appreciates BOEM including language in Section 4.1.1.21 relating to current conditions, social science information, and visual and noise impacts that we communicated to you on December 22, 2015. Inclusion of this language provides important context to oil and gas development in the vicinity of GUIS. We also appreciate BOEM referencing in Section 4.1.1.3

TAKE PRIDE IN AMERICA

that pipelines, associated with CPA development proposing to cross GUIS must be approved by the Secretary Interior and are "subject to appropriate regulations for the protection of the natural and recreational values for which the Seashore was established..." (16 U.S.C. Section 459h-3). Below are additional comments and concerns that we believe merit consideration of excluding new oil and gas leasing within 15 miles of GUIS.

Conserving Wilderness Character

NPS-2

As we have mentioned in past letters, oil and gas development as close as three miles from Horn and Petit Bois Islands could degrade their wilderness character, which the NPS works to preserve. According to the Wilderness Act (16 U.S.C. 1133(b)), "…each agency administering any area designated as wilderness shall be responsible for preserving wilderness character." NPS Director's Order 41 Wilderness Stewardship, Section 6.2 states:

> Wilderness character is the combination of biophysical, experiential, and symbolic ideals that distinguishes wilderness from other lands. The five qualities of wilderness character are (1) untrammeled, (2) undeveloped, (3) natural, (4) offers outstanding opportunities for solitude or primitive and unconfined recreation, and (5) other features of scientific, educational, scenic, or historical value.

Additional guidance on how the NPS manages designated wilderness is provided in the Section 6 Introduction. It states:

> The goal of wilderness stewardship is to keep these areas as natural and wild as possible in the face of competing purposes and impacts brought on by activities that take place elsewhere in the park and beyond park boundaries. NPS employees should understand this goal, work together and engage other agencies and partners to provide for an enduring resource of wilderness.

Furthermore, because there are only a few NPS managed barrier islands that are protected as wilderness, the Mississippi barrier islands are highly important for research and scientific study. According to Management Policies Section 6.3.6.1:

> The Service recognizes that wilderness can and should serve as an important resource for long-term research into and study and observation of ecological processes and the impact of humans on these ecosystems.

Odor and Trash

NPS-3

GUIS has received complaints that unpleasant fumes from oil and gas rigs are affecting their experience at the park. According to Occupational Safety & Health Administration (OSHA), Hydrogen Sulfide from oil and gas operations "…causes you to quickly lose your sense of smell." Flaring operations associated with H2S production will generate Sulfur Dioxide (S02), another toxic gas." Management Policies (2006) Section 4.11 states:

NPS-3

> The Service will preserve, to the greatest extent possible, the natural flow of natural chemical information and odors by preventing (1) the release of human-generated chemicals that can block the release, deposition, or perception of natural chemicals; and (2) human actions that disrupt or commingle the pathways through which natural chemicals are dispersed.

This is an important NPS issue that appears to be missing from the Draft SEIS. Another issue is that marine debris from offshore rigs regularly washes up on the park's beaches. This trash is not only unsightly to park visitors; it can injure park wildlife, is challenging to remove and incurs financial costs to the park. The NPS recommends that the Final SEIS include some potential mitigation measures that could be adopted by developers as part of future lease requirements to address these concerns.

Light Pollution

NPS-4

Increased light pollution has the potential to affect the night sky resources of the park, reduce the ability for dark eye sight adaptation, and could worsen the ability of park visitors to view the night sky. It could also negatively impact nesting adult sea turtles, and decrease sea-finding success for hatchling sea turtles. We are particularly concerned about the endangered Loggerhead Sea Turtle (Caretta caretta), which have designated Critical Habitat on Horn and Petit Bois islands under the Endangered Species Act. Increased light pollution is known also to affect migrating songbirds, nesting shorebirds, and pelagic seabirds. NPS policy directs units of the National Park System to work to preserve the opportunity of park visitors to view the night sky. According to Section 4.10 of the NPS's Management Policies (2006):

> The Service will preserve, to the greatest extent possible, the natural lightscapes of parks, which are natural resources and values that exist in the absence of human-caused light… Improper outdoor lighting can impede the view and visitor enjoyment of a natural dark night sky. Recognizing the roles that light and dark periods and darkness play in natural resource processes and the evolution of species, the Service will protect natural darkness and other components of the natural lightscape in parks.

The NPS is pleased to see that the Draft SEIS references some of the baseline information that was researched by the NPS's Natural Sounds and Night Sky Division and shared with BOEM. However, we still encourage BOEM to conduct a night sky impact analysis of how the project may impact GUIS's night sky. This analysis could describe existing conditions, estimate anticipated increases in artificial light, describe potential impacts (i.e., anthropogenic light ratio, habitat, migratory species, night sky views), and consider potential mitigation techniques to lessen the impact. Furthermore, to better understand how the project may impact park scenery, during both day and night, we ask that the Final SEIS include a visual resource impact analysis. The assessment should include a viewshed analysis that identifies where the project may be seen from key observation points within the park and how the park's scenery and night sky may be impacted.

NPS-5

We would also like to see reference in the Final SEIS on how certain lighting designs can limit light pollution. Utilizing full cut-off lighting fixtures, lighting only the intended task area, using

NPS-5

the minimal intensity of light necessary, and using appropriate switches, timers or motion sensors to turn lights on and off at the appropriate times at the existing and proposed expansion of the facility would limit light pollution emitted from offshore oil and gas rigs. More information can be found at: http://www.nature.nps.gov/night/practices.cfm.

Construction and Operation Noise

NPS-6

While we appreciate BOEM referencing the NPS's baseline noise levels that were conducted in the Draft SEIS, we believe BOEM should undertake further analysis in the Final SEIS so the NPS and stakeholders can better understand how construction and operation noise may impact GUIS. Management Policies (2006) Section 4.9 states:

> Natural sounds occur within and beyond the range of sounds that humans can perceive, and they can be transmitted through air, water, or solid materials. The National Park Service will preserve, to the greatest extent possible, the natural soundscapes of parks.

Because 80 percent of GUIS under management by the NPS is underwater, it is especially important to understand potential underwater acoustic noise.

We appreciate the opportunity to share this information with BOEM. Should you have any questions or need additional information, please contact Cassity Bromley, GUIS's Chief of Science & Resource Stewardship, at 850-916-3011 or cassity_bromley@nps.gov; or Bryan Faehner, Southeast Region Energy and Environmental Protection Specialist, at 202-513-7256 or bryan_faehner@nps.gov.

Sincerely,

Daniel R. Brown

Daniel R. Brown
Superintendent

NPS-1 As noted in **Chapter 1.1**, the purpose of the proposed Federal action is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the OCSLA (67 Stat. 462), as amended (43 U.S.C §§ 1331 *et seq*.) subject to environmental safeguards, as clarified throughout Sections 3 and 5 of the OCSLA and 30 CFR § 550.101(b)(2).

Over time, using adaptive management practices, BOEM and its predecessors have proactively developed a suite of mitigating measures that are applied at the prelease or postlease phases of the oil and gas program to avoid and protect fixed biologically and culturally sensitive features, which includes the GUIS (Gulf Islands National Seashore Information to Lessees and Operators [ITL]). This ITL ensures that postlease plans submitted by lessees of whole and partial lease blocks within the first 12 mi (19 km) of Federal waters (refer to **Figure 4-4**) near the GUIS are reviewed by BOEM to determine if visual impacts are expected and if any additional mitigative action is required.

Based on historical leasing patterns, the CPA lease sale would likely only minimally contribute to the existing disturbances from OCS and non-OCS sources. To be more specific, there are currently three producing platforms within 7-15 mi (11-24 km) of the GUIS offshore the States of Louisiana, Mississippi, and Alabama. Some OCS platforms are visible on the horizon. Numerous OCS structures and wells have existed within 15 mi (24 km) of the GUIS over the years. Most of these platforms have been removed, with only a few structures currently within 15 mi (24 km) of Petit Bois Island, which is a designated wilderness area.

Even without the presence of oil and gas activities in State waters and on the Federal OCS, there is substantial vessel traffic in this area due to the presence of federally designated shipping safety fairways and anchorage areas to provide unobstructed approaches for vessels using U.S. ports (33 CFR part 166). These visual impacts would remain ongoing and unaffected by the proposed action. Based on the information presented above, BOEM believes that the alternative proposed in this comment would not achieve the desired goal of reducing environmental impacts, but it could adversely affect the economic benefits of the lease sale. For these reasons and because of the environmental protection measures already implemented by BOEM and the BSEE through the established ITL for the subject area, the alternative proposed in this comment was not analyzed.

NPS-2 Comment noted. The functions of BOEM include leasing, exploration, and development of oil and gas resources, plan administration, environmental studies, NEPA analysis, resource evaluation, economic analysis, and the management of renewable energy and marine minerals in the OCS. The BSEE is responsible for enforcing safety and environmental regulations. The functions of the BSEE include all field operations, including permitting and research, inspections, offshore regulatory programs, oil-spill response, and training and environmental compliance functions. Refer to the response to comment NPS-1 for more information on the purpose and need for the proposed actions evaluated in this Supplemental EIS.

BOEM and its predecessors have made a concerted effort to identify and protect sensitive resources and habitats in the Gulf of Mexico since 1973 (over 4 decades). Refer to **Chapter 1.3.1.1** for more information on the studies conducted as part of the Gulf of Mexico OCS Region's Environmental Studies Program and to **Chapters 1.4 and 1.5** for more information on the protective mitigating measures that are applied at the prelease or postlease phases of the OCS oil and gas program. BOEM addressed these issues in Chapter 4.2.1.21 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1.1.21 of the CPA 241/247 and EPA 226 Supplement EIS, and in **Chapters 4.1.1.3 and 4.1.1.21** of this Supplemental EIS.

Protective measures are also in place to mitigate the potential impacts to the Gulf Islands National Seashore (Gulf Islands National Seashore ITL). This ITL ensures that postlease plans submitted by lessees of whole and partial lease blocks within the first 12 mi (19 km) of

Federal waters (refer to **Figure 4-4**) near the GUIS are reviewed by BOEM to determine if visual impacts are expected and if any additional mitigative action is required.

NPS-3 Mitigating measures have been proposed, identified, evaluated, or developed through previous BOEM-lease sale NEPA review and analysis. Many of these mitigating measures have been adopted and incorporated into regulations and/or guidelines governing OCS oil and gas exploration, development, and production activities.

Because of improved handling of waste and trash by industry and because of annual awareness training required by marine debris mitigations, the plastics in the ocean are decreasing and the effects on offshore and coastal marine life are reduced. Lease stipulations and regulations, as clarified by NTLs, are in place to reduce impacts from marine trash and debris.

Chapter 4.2.1.1 of the WPA233/CPA 231 Supplemental EIS provides an overview of the air quality modeling used to determine potential air quality impacts. **Chapter 4.1.1.1** of this Supplemental EIS includes a description of the air quality analysis performed for the routine activities and potential accidental releases of H_2S associated with the CPA proposed action. The impact analysis is based on four parameters—emission rates, surface winds, atmospheric stability, and mixing height. Emissions of pollutants into the atmosphere from the activities associated with the CPA proposed action are projected to have minimal effects on onshore air quality because of the prevailing atmospheric conditions, emission rates and mixing heights, and the resultant pollutant concentrations. BOEM expects that concentrations at the GUIS resulting from OCS sources of H_2S, to be at very low nuisance levels. The source of odors in the GUIS may include releases from the local marsh muds or nearby State oil and gas activity as well. Therefore, several contributing factors could be responsible for the odors at Gulf Islands National Seashore.

In the postlease stage, BOEM reviews all exploration and development plans in the Gulf of Mexico OCS for the possible presence of H_2S in the area(s) identified for exploration and development activities. Activities determined to be associated with the presence of H_2S are subjected to further review and requirements. Federal regulations at 30 CFR § 250.490(c) require all lessees, prior to beginning exploration or development operations to request a classification of the potential for encountering H_2S. The classification is based on previous drilling and production experience in the areas surrounding the proposed operation, as well as other factors.

According to BSEE's regulations at 30 CFR § 250.490(f), all operators on the OCS involved in the production of sour gas or oil (i.e., >20 ppm) are required to file an H_2S Contingency Plan. This plan lays out the procedures to ensure the safety of the workers on the production facility. The NTL 2009-G31, "Hydrogen Sulfide (H_2S) Requirements," provides clarification, guidance, and information regarding BSEE's H_2S regulations at 30 CFR part 250.

NPS-4 BOEM has determined that conducting a night-sky impact analysis is not essential to a reasoned choice among alternatives. BOEM has used generally accepted scientific principles, including incorporating data, mapping, research, and photographic evidence, to estimate the visual impacts of OCS structures that may arise from the CPA proposed action. BOEM has incorporated information provided by the NPS (Brown, official communication, 2014) related to potential anthropogenic light impacts to GUIS islands into the impact analysis found in the CPA 241/247 and EPA 226 Supplemental EIS and this Supplemental EIS. BOEM continues to acknowledge that there is still incomplete or unavailable information related to the visual impacts that may arise due to site-specific offshore oil and gas activities. However, potential visual impacts of site-specific offshore oil and gas activities will be addressed at later stages of BOEM's review process, following the Gulf Islands National Seashore ITL. This ITL ensures that postlease plans submitted by lessees of whole and partial lease blocks within the

first 12 mi (19 km) of Federal waters (refer to **Figure 4-4**) near the GUIS are reviewed by BOEM to determine if visual impacts are expected and if any additional mitigative action is required.

BOEM acknowledges that existing data may be incomplete or unavailable concerning the effects of platform lighting on sea turtles. Much of the literature focuses on coastal artificial lighting affecting nesting female sea turtles and hatchlings (Witherington, 1992; Tuxbury and Salmon, 2005; Witherington et al., 2014). However, platforms on the OCS are located at least 3 mi (5 km) offshore and would not likely affect nesting turtles or hatchlings. Although more information on platform lighting effects on sea turtles may be relevant in order to more precisely estimate impacts, BOEM does not consider it essential to the reasoned choice among alternatives. BOEM has used generally accepted scientific principle, including incorporating the current available data and research as it becomes available, to evaluate the potential lighting impacts of OCS structures that may arise from the CPA propose action.

NPS-5 BOEM has added the requested information to **Chapter 4.1.1.21** ("Recreational Resources").

Additionally, protective measures are in place to mitigate the potential impacts, including visual impacts to the GUIS through the Gulf Islands National Seashore ITL. This ITL ensures that postlease plans submitted by lessees of whole and partial lease blocks within the first 12 mi (19 km) of Federal waters (refer to **Figure 4-4**) near the GUIS are reviewed by BOEM to determine if visual impacts are expected and if any additional mitigative action is required.

NPS-6 BOEM is aware of existing information gaps in our understanding of the impacts of anthropogenic noise on marine organisms. However, the best available information indicates that, due to the distances involved, the expected impacts of routine construction and operational noises to organisms in the GUIS as a result of OCS oil-and gas-related activities would be negligible. Detailed analyses can be found in Chapters 4.2.1.12, 4.2.1.13, 4.2.1.19, and 4.2.1.20 of the 2012-2017 WPA/CPA Multisale EIS, from which this Supplemental EIS is tiered.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
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61 FORSYTH STREET
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APR 1 1 2016

Mr. Gary D. Goeke
Chief, Environmental Assessment Section
Leasing and Environment (MS 5410)
Bureau of Ocean Energy Management (BOEM)
1201 Elmwood Park Boulevard
New Orleans, Louisianna 70133-2394

Re: EPA NEPA Review Comments on BOEM's DSEIS for "Gulf of Mexico Outer Continental Shelf (OCS) Oil and Gas Lease Sales: 2017 Central Planning Area Lease Sale 247"; CEQ #20160044

Dear Mr. Goeke:

The U.S. Environmental Protection Agency has reviewed the subject Bureau of Ocean Energy Management (BOEM) Draft Supplemental Environmental Impact Statement (DSEIS) in accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. It is our understanding that BOEM proposes a lease sale in the Gulf of Mexico (GOM) Outer Continental Shelf (OCS) for lease block 247 in the Central Planning Area. The EPA understands that this DSEIS addresses one proposed OCS lease sale 247 in the Central Planning Area (CPA) and that this EIS updates the baseline conditions and potential environmental effects of oil and gas activities since the publication of several previous BOEM lease sale EISs[1].

The EPA has participated in several recent NEPA reviews for BOEM actions, including reviews of the Draft Programmatic Environmental Impact Statement (PEIS) for the proposed 2012-2017 Outer Continental Shelf Oil and Gas Leasing Program and the 2012-2017 WPA/CPA Multi-sale EIS and CPA 241/247/235 EISs. The EPA Region 4 and Region 6 have also entered into a cooperating agency agreement with BOEM on the Multi-sale EIS for the 2017-2022 proposed oil and gas lease sales in the GOM OCS.

Based on our analysis of the above referenced proposed action, the EPA rates this DSEIS as "EC-2", i.e., "the EPA has environmental concerns and requests additional information" in the Final Supplemental EIS (FSEIS). The EPA's rating system criteria can be found online at: http://www.epa.gov/oecaerth/nepa/comments/ratings.html. Our primary concerns associated with the proposed actions are related to potential impacts to air quality, coastal ecosystems, wetlands, and mitigation. Detailed technical comments are enclosed with this letter which more clearly identifies our concerns and comments. We request that the FSEIS include specific responses to our comments.

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[1] Abstract - DSEIS

Should you or BOEM staff have questions regarding our comments, please feel free to contact Dan Holliman, of my staff, at 404/562-9531 or holliman.daniel@epa.gov.

Sincerely,

G. Alan Farmer
Director
Resource Conservation and Restoration Division

Enclosures

DETAILED TECHNICAL COMMENTS ON THE DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (DSEIS) FOR THE U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF OCEAN ENERGY MANAGEMENT (BOEM) GULF OF MEXICO OUTER CONTINENTAL SHELF (OCS) OIL AND GAS LEASE SALE 247 CENTRAL PLANNING AREA CEQ NO.: 20160044

BACKGROUND:

The Draft Supplemental Environmental Impact Statement (DSEIS) was prepared by the U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM) Gulf of Mexico (GOM) Outer Continental Shelf (OCS) Region for lease area 247 in the Central Planning Area (CPA). The EPA understands that this EIS supplements information covered in the following past NEPA documents: *Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; Central Planning Area Lease Sales 227, 231, 235, 241, and 247, Final Environmental Impact Statement* (2012-2017 WPA/CPA Multi-sale EIS) and *Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231, Final Supplemental Environmental Impact Statement* (WPA 233/CPA 231 Supplemental EIS); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2015-2017; Central Planning Area Lease Sales 235, 241, and 247, Final Supplemental Environmental Impact Statement* (CPA 235/241/247 Supplemental EIS*); and Gulf of Mexico Oil and Gas Lease Sales: 2016 and 2017; Central Planning Area Lease Sales 241 and 247; Eastern Planning Area Lease Sale 226, Final Supplemental Environmental Impact Statement* (CPA 241/247 and EPA 226 Supplemental EIS*)*. The EPA provided review comments on these previous BOEM EISs in accordance with our responsibilities under Section 102(2)(C) of NEPA and Section 309 of the Clean Air Act.

ALTERNATIVES PROPOSED:

Alternatives for Proposed Central Planning Area Lease Sale 247[2]

- *Alternative A—The Proposed Action (Preferred Alternative)*: This alternative would offer for lease all unleased blocks within the proposed CPA lease sale area for oil and gas operations with the following exceptions:

  1. Whole and portions of blocks deferred by the Gulf of Mexico Energy Security Act of 2006; and
  2. Blocks that are adjacent to or beyond the United States' Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap.

- *Alternative B - The Proposed Action Excluding the Blocks Near Biologically Sensitive Topographic Features*: This alternative would offer for lease all unleased blocks within the proposed CPA lease sale area, as described for the proposed action (Alternative A), but it would exclude from leasing any unleased blocks subject to the Topographic Features Stipulation.

- *Alternative C - No Action*: This alternative is the cancellation of a proposed CPA lease sale.

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[2] Alternatives section cited directly from p. ix in DSEIS

AIR QUALITY

The EPA is responsible for ensuring compliance with the National Ambient Air Quality Standards (NAAQS) in the Gulf States of Texas, Louisiana, Mississippi, Alabama and Florida. In addition, EPA Region 4 is responsible for implementing and enforcing Clean Air Act (CAA) requirements for OCS sources offshore the state seaward boundaries of all areas of the Gulf of Mexico (GOM) east of 87'30" (*see* CAA section 328). Pursuant to the CAA and applicable federal regulations (see 40 CFR 55), OCS activities, such as exploratory drilling operations and production platforms are subject to the EPA requirements to obtain air quality preconstruction and operating permits.

The air quality sections of the above referenced DSEIS were reviewed by the EPA Region 4 Air, Pesticides, and Toxics Management Division (APTMD). The air quality analysis incorporates by reference the air quality analysis in the 2012-2017 WPA/CPA Multi-sale EIS and other updated supplemental EIS documents, including the WPA 233 and CPA 231 Supplemental EIS, the CPA 235/241/247 Supplemental EIS, and the CPA 241/247 and EPA 226 Supplemental EIS. BOEM has re-examined the analysis for air quality since these documents were prepared and has determined that no new significant information was discovered that would alter previous impact conclusions for air quality. Likewise, our concerns remain essentially unchanged from our March 2015 and October 2015 air quality comments, including the following, which are summarized below:

USEPA-1

- The referenced analyses predict modeled emission results above the EPA significant impact level (SIL) for the annual NO2 standard and the standard for 24-hour particulate matter of 2.5 microns or less (PM2.5). The EPA continues to recommend that exceedance of a SIL warrants more refined analysis be conducted to validate the BOEM conclusions that the proposed actions are projected to have minimal air quality impacts.

USEPA-2

- The EPA continues to have concerns that emissions from the activities of well stimulation vessels are not included in the air quality impacts analysis. The BOEM indicated they would be including well stimulation activity in the 2014 emissions inventory. Consistent with BOEM's stated objective of providing updated information in this supplemental EIS, and given that the lease sale will result in drilling wells into the next decade, the EPA recommends that air quality analyses include all emissions activities currently in use and expected to result from the 2017 lease sales.

USEPA-3

- The EPA continues to recommend that BOEM develop measures to monitor and mitigate NAAQS pollutants, such as NOx, and PM2.5, as well as, greenhouse gases, and to include recommendations for these measures in the final EIS and Record of Decision (ROD). The EPA suggests that reasonable mitigation measures that should be considered include: the use of low sulfur fuels, including liquefied natural gas; inherently lower polluting engine designs; use of tier certified non-road and marine engines (prohibiting the use of engines intended for export), and electrification of cranes and support equipment. The EPA also encourages the BOEM to include provisions for periodic or continuous emissions monitoring for all large emission units to ensure that emissions are maintained below the exemption thresholds, and hence, ensure compliance with the NAAQS and the Coastal Zone Management Act (CZMA).

USEPA-4

- The EPA continues to believe that the transport distances used in the incorporated air quality analyses are beyond the stated reliable limits of the Offshore Coastal Dispersion model. The BOEM's February 12, 2016, response to our comments indicates that AERMOD-AERCOARE approach is being evaluated for use in the Gulf of Mexico. While AERMOD-AERCOARE has

USEPA-4

advantages when offshore meta-data is not available, such as in the Arctic, this model is also not designed for long-range transport.

USEPA-5

- The EPA continues to recommend that the BOEM include receptors at the state seaward boundary to ensure that the NAAQS are protected and that the air quality within this area is not adversely impacted by OCS activity. The EIS serves as a document to allow decision makers to discern compliance with applicable statutes and regulations, including the requirements of the Outer Continental Shelf Lands Act (OCSLA), the CAA, the CZMA, and the NAAQS within state seaward boundaries. As indicated in our previous comments, this near-shore area is subject to state attainment planning, is the area located closest to the lease sale blocks, and is an area of human activity, including recreational and commercial boating and fishing. Hence, information from the BOEM regarding the impacts at the states seaward boundary is critical for the states to ensure this near shore area is in compliance with the NAAQS, as well as with the CZMA. In addition, the OCSLA refers to impacts on "the air quality of any State". The state jurisdiction extends, by statute, to the state seaward boundary (3 or 9 miles from the shore).

In addition, we have the following recommendations to specific sections of the DSEIS:

USEPA-6

- The accidental release of hydrocarbons discussed on page 4-9 identifies both the substances and the emissions produced during a release and a fire. The EPA recommends that this discussion also indicate that emissions of greenhouse gases and hazardous air pollutants that would also likely form during these events.

USEPA-7

- The DSEIS concludes that non-OCS oil and gas related activities produce greater emissions than comparable OCS activities, and thereby, represent the majority of the cumulative impacts onshore, page 4-10. This statement does not contain a reference to specific emission inventories or studies. The EPA recommends that the BOEM include the relevant citation(s) in future NEPA documents.

NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM PROGRAM

USEPA-8

The EPA notes that Section 3.1.1.3 includes information on the National Pollution Discharge Elimination System (NPDES) program and permit limits established under this program. Specifically, it is stated on page 3-10 that NPDES: "permits place limitations on the toxicity of all effluents, as well as other requirements for monitoring and reporting". The EPA notes that it is inaccurate to state that all effluents will have permit toxicity limits. For example, no toxicity testing is required for deck drainage, domestic wastewater, and sanitary wastewater. The current EPA Region 4 NPDES general permit includes best conventional pollutant control technology, and best available technology economically achievable limitations for existing sources and new source performance standards limitations for new sources as promulgated in the effluent guidelines for the offshore subcategory. For select wastewater streams, stricter requirements apply based on the best professional judgment of the permit writer.

Recommendation: The EPA Region 4 recommends that the FSEIS be revised to include the above clarification related to effluent toxicity permit limits. In addition, the EPA Region 4 would like to also bring to BOEM's attention that a newly proposed NPDES general permit for OCS activities in our jurisdiction area will be available for public review and comment in the near future. The proposed reissuance of this NPDES permit covers existing and new source facilities located on Federal leases occurring in water depths seaward of 200 meters, occurring offshore the coasts of Alabama and Florida. The western boundary of the coverage area is demarcated by Mobile and Visoca Knoll lease blocks located seaward of the outer boundary of the territorial seas from the coasts of Mississippi and Alabama.

USEPA-8

The EPA anticipates that the proposed NPDES permit will establish limitations on the amounts of pollutants allowed to be discharged and will be drafted in accordance with the provisions of the Clean Water Act and other lawful standards and regulations. Specifically, the EPA anticipates that the proposed EPA Region 4 NPDES general permit will include a preferred alternative that whole effluent toxicity testing requirements apply for produced water, well treatment completion and workover fluids commingled with produced water, and some discharged categorized as miscellaneous. When the new EPA Region 4 general permit is noticed to the public, federal agencies and other stakeholders, the new changes and conditions in the permit should be considered by the BOEM when discussing NPDES issues in the FSEIS for lease sale 247 and other future BOEMS EISs.

WELL STIMULATION

USEPA-9

The EPA notes that Section 3.1.1.3 includes information on the use of well stimulation fluids (i.e., "fracking fluids") as a part of the well completion process. The EPA also understands that the potential for impacting benthic environments and surrounding water columns from the use of well stimulation fluids is not clearly understood. The EPA also understands that the BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) published an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with the use of well stimulation treatments for offshore oil development off the coast of Southern California. With the understanding that geologic formations off Southern California and the GOM are very different, the EPA believes that well stimulation treatment information covered in this EA may be relevant to this proposed action and should be discussed in FSEIS.

Recommendation: The EPA recommends that the BOEM consider any new relevant information covered in the BSEE/BOEM EA described above and supplement the well stimulation discussion in the FSEIS. The EPA notes more extensive discussion in the DSEIS related to the use of well stimulation fluids and historically provided. However, the EPA recommends that the BOEM provide more specifics related to how many wells (covered by the proposed action – 247) are expected to receive this type of treatment and a clear description of potential impacts.

WETLANDS AND COASTAL AREAS

USEPA-10

Coastal wetland systems are very sensitive systems that are increasingly stressed from all types of activities including but not limited to coastal development, maintenance dredging of channels, and oil and gas development. These systems are also stressed due to natural events such as hurricanes. Stresses on these systems are only predicted to increase with climate change and sea level rise.

A report by Stedman and Dahl (2008) on the status and trends of wetlands in coastal watersheds states that the "Gulf of Mexico coastal watersheds exhibited substantial losses in freshwater wetlands. This rate of loss was 6 times higher than the rate of freshwater vegetated wetlands losses in the Atlantic coastal watersheds. The estimated losses for all wetland types in the Gulf of Mexico were 25 times higher than those estimates for the Atlantic over the course of this study".[3] This report also indicates that coastal areas along the panhandle of Florida, Alabama, Mississippi, Louisiana, and Texas are listed as areas of greatest coastal wetland loss in the Gulf of Mexico and that a " majority of the coastal wetland loss (61,800 acres per year) from 1998 to 2004 occurred in the Gulf of Mexico."

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[3] Stedman, S. and T.E. Dahl. 2008. Status and trends of wetlands in the coastal watersheds of the Eastern United States 1998 to 2004. National Oceanic and Atmospheric Administration, National Marine Fisheries Service and U.S. Department of the Interior, Fish and Wildlife Service. (*32 pages*)

USEPA-10

The EPA also notes that the State of Louisiana has also expressed concerns about impacts to coastal wetland systems and has recommended to the BOEM to quantify all secondary, indirect, and cumulative losses to their coastal zone from offshore energy development and a compensatory mitigation for these losses.

Recommendation: The EPA notes the BOEM's efforts to better quantify historical wetland losses for coastal areas in the CPA and the current status of these systems. As the EPA has expressed in several previous NEPA comment letters, we remain concerned about the potential for cumulative impacts on near shore wetlands and coastal areas.

ENVIRONMENTAL JUSTICE (EJ)

USEPA-11

The federal action proposed under this DSEIS has the potential to impact EJ communities, both negatively and positively. The potential negative impacts on EJ communities involve oil spills that negatively impact communities that rely on commercial and recreational fishing, oystering, and subsistence fishing. Other negative impacts are associated with the oil-related infrastructure and its impact on minority and low-income communities. The infrastructure support system for oil and gas related industries in the GOM is highly developed, widespread, and has operated for decades within a heterogeneous GOM population. The potential positive impacts associated with the proposed action include increases in economic activity and job creation in these same communities. The EPA generally supports the efforts made by the BOEM to conduct subsistence research in an effort to document the potential impact on these communities.

Recommendation: In a response dated February 12, 2016, to our comments on a previous EIS, the BOEM provided an update on the "Subsistence in Coastal Louisiana: An Exploratory Study." Based on the response, the EPA understands that the study has not been made publically available. The EPA recommends that when the report becomes available, the data and full report should be discussed in future lease sale EISs and made available to the public.

NATIONAL PARK SERVICE CONCERNS

USEPA-12

The EPA notes that the National Park Service (NPS) is a cooperating agency on this EIS and has provided comments prior to the release of the DSEIS. The NPS expressed concerns about impacts to the Gulf Islands National Seashore (GUIS) recommended placing limitations and/or exclusions on lease sales within a certain distance from the GUIS. In addition, the NPS requested more studies and evaluation of oil and gas activities on the GUIS.

Recommendation: The EPA notes that the BOEM refers the reader to Chapter 5.12 of the CPA 241/247 and EPA 226 Supplemental EIS (page 2-7) for BOEM's response to the NPS. The EPA reviewed this previous EIS and notes that Chapter 5.12 is not included. However, the EPA notes BOEM's response to visual impacts to the GUIS on page 4-82 of this DSEIS. In addition, the EPA notes that the other NPS concerns such as subsidence of barrier islands, impacts to natural resources at the islands, impacts to the wilderness character of the islands, etc (page 5-4 and 5-5) were not specifically addressed in this EIS. The EPA recommends BOEM consider providing specific responses to all of the NPS concerns in the FSEIS for this proposed action.

USEPA-1 The Final CPA 247 Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA and EPA since publication of the 2012-2017 Five-Year Program EIS, 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 Supplemental EIS. All of these EISs discuss the air quality analyses performed by BOEM and the minimal impacts expected onshore as a result of the proposed lease sale and alternatives, including the no action alternatives. Because of the conservative approach used to assess air quality impacts, BOEM does not feel that further analysis is warranted at this stage; however, BOEM appreciates the recommendation for a more refined analysis and will continue to work towards a more refined overall assessment of air quality impacts in future EISs.

USEPA-2 Well stimulation vessels would be included in future emission inventories. The 2011 Gulfwide Emissions Inventory includes well stimulation vessel emissions in the support vessels emissions category. Well stimulation emissions (running the engines that apply the hydraulic pressure to the reservoir) are not included in BOEM's postlease plan review. However, propulsion emissions from the stimulation vessel going to and from the site are included in BOEM's postlease plan review. BOEM and the BSEE are currently discussing how to count and track stimulation events. Additional information will be available for support vessel emissions with the release of the 2014 Gulfwide Emissions Inventory.

USEPA-3 BOEM appreciates the USEPA's two-part recommendation regarding monitoring and mitigating measures. BOEM is considering this recommendation and how it might be implemented. To ensure compliance with the NAAQS and the CZMA, which is consistent with the State seaward boundary, BOEM is considering developing measures to monitor NAAQS pollutants and is conducting a tracer study.

USEPA-4 BOEM appreciates the USEPA's comment. BOEM acknowledges that every available air quality model has capabilities and limitations to represent emissions sources and to estimate the impact. BOEM's Offshore and Coastal Dispersion (OCD) air quality model is currently a USEPA's preferred model for use in offshore environments; it is a short-range, air pollutant transport model for distances of less than 50 km (31 mi). However, this model was developed more than 3 decades ago; it needs to be updated. As for the long-range, air pollution transport for the distance greater than 50 km (31 mi), the CALPUFF is being used. BOEM is considering replacing the OCD model with AERMOD-AERCOARE; "this model is also not designed for long-range transport." Basically, the AERMOD and CALPUFF air quality models are land-based air quality models. BOEM is considering conducting a tracer study to remedy the shortcomings of the OCD, AERMOD, and CALPUFF air quality models.

USEPA-5 Based on the USEPA's previous recommendations to include modeling receptors at the State seaward boundary, BOEM has included this requirement in the ongoing $2.1 million "Air Quality Modeling in the Gulf of Mexico Region" study (http://www.boem.gov/GM-14-01/). Also in response to the USEPA's suggestion that this information is necessary for compliance with applicable statues and regulations, this requirement has been included in the "Proposed Rule on Air Quality Control, Reporting, and Compliance" draft regulation http://www.boem.gov/Air-Quality-Proposed-Rule/). Given that BOEM does not yet have the results from the ongoing air quality modeling study, for this Supplemental EIS, BOEM relied on emissions inventory data, available studies on OCS oil- and gas-related activities, and postlease exploration and development plan information, as well as previous proposed action scenario data and impacts analysis, to fill data gaps to assess the potential impacts. This approach was adequate because it assessed a combination of pollutants from OCS oil- and gas-related activities, non-OCS oil- and gas-related activities, and non-oil and gas activities.

USEPA-6 This Supplemental EIS has been updated to indicate the potential for greenhouse gases to be included in these emissions.

USEPA-7 BOEM has included the citation "Wheeler et al., 2008" in this Supplemental EIS.

USEPA-8 A correction has been made to the text to clarify that all effluents are not subject to the terms of the existing USEPA Region 4 NPDES permit. While BOEM appreciates the additional verbiage clarifying the content of the NPDES permit for USEPA Region 4, that information has not been included in this Supplemental EIS as the comment references a chapter that is discussing the possible effluents involved with fracking activities. Refer to Chapter 3.1.1.4 of the 2012-2017 WPA/CPA Multisale EIS for additional information regarding other operational waste discharges, including deck drainage, domestic wastewater, and sanitary wastewater. When the proposed USEPA Region 4 NPDES permit becomes available, future EISs will include information regarding the new permit requirements.

USEPA-9 BOEM has reviewed the *Programmatic Environmental Assessment on the Use of Well Stimulation Treatments on the Pacific Outer Continental Shelf: Final Programmatic EA* (USDOI, BSEE and USDOI, BOEM, 2016). Well stimulation activities and potential impacts differ greatly between the Pacific and Gulf of Mexico OCS due to a variety of factors (e.g., different reservoir properties and different affected environment); therefore, BOEM has analyzed the use and potential impacts from these activities specifically for the Gulf of Mexico OCS in this Supplemental EIS. The primary drivers of offshore completions in the GOM are sand control and formation stimulation, with an extensive history of successful application. The primary impact-producing factor of concern related to well stimulation activities in the Gulf of Mexico OCS would be discharges of TCW fluids. Well TCW fluids are comingled with other produced fluids and regulated as produced water through the NPDES permit process. Because TCW fluid discharges must meet the NPDES permits' allowable discharge requirements for produced water, BOEM has reasonably concluded that the effects from these discharges should be limited. The potential effects of produced waters (including well TCW fluids) on other resources, such as coastal waters (**Chapter 4.1.1.2.1**), offshore waters (**Chapter 4.1.1.2.2**), chemosynthetic deepwater benthic communities (**Chapter 4.1.1.9**), nonchemosynthetic deepwater benthic communities (**Chapter 4.1.1.10**), and soft bottom benthic communities (**Chapter 4.1.1.11**), have also been analyzed and are expected to be negligible due to the assumed compliance with all permitting requirements and existing regulations.

Additional text related to well stimulation activities has been added to **Chapter 3.1.1.3** of this Supplemental EIS. These activities are conducted after a well has been drilled and completed for production, and these activities are covered by a permit known as an Application for Permit to Modify. All Applications for Permit to Modify are reviewed and approved by the BSEE. BOEM carries forward any established mitigating measures based upon lease stipulations/terms, regulatory requirements, etc., to the individual plan actions.

USEPA-10 Comment noted. BOEM continues to update the wetlands cumulative impacts section of Chapter 4.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS with each subsequent Supplemental EIS. There is an update to the Stedman and Dahl (2008) report referenced in your comment. That update, Dahl and Stedman (2013), was cited in the CPA 241/247 and EPA 226 Supplemental EIS, which is incorporated by reference and which has been cited in this Supplemental EIS. Other recent studies of land loss were cited in the wetlands' cumulative section of the CPA 235/241/247 Supplemental EIS (Chapter 4.1.1.4), which included an estimate of the proportion of loss caused by various factors, including both OCS oil- and gas-related and non-OCS oil- and gas-related factors. These studies are State of Louisiana, Coastal Restoration Authority (2012a) and Couvillion et al. (2013). In addition, BOEM has sponsored a new study, "Gulf of Mexico Land Change Assessment and Application to Louisiana Coastal Habitat Loss," to evaluate habitat change in the Louisiana

coastal zone from 2007 through 2014 and to evaluate recent (1984-2014) land change in the northern Gulf of Mexico coastal zone.

BOEM has included in this Supplemental EIS the relevant information related to its cumulative effects analysis, including both the proposed action and all OCS oil and gas program activities in its consideration. As noted in **Chapter 4.1.1**, the incremental contribution of an individual lease sale to these impacts is very small.

USEPA-11 Comment noted. The study you referenced in your comment, "Subsistence in Coastal Louisiana: An Exploratory Study," is a BOEM-sponsored study that has not been finalized or published. When this study is completed, BOEM will consider the findings of the study in future NEPA analyses. BOEM also makes finalized and published studies available to the public through the Environmental Studies Program Information System. This System includes a search tool that is hosted on a shared platform MarineCadastre.gov/, which is developed in partnership with NOAA's Office for Coastal Management.

USEPA-12 Comment noted. Refer to Chapter 5.12 of the CPA 241/247 and EPA 226 Supplemental EIS for BOEM's responses to the NPS's comments related to the CPA 241/247 and EPA 226 Supplemental EIS. In addition, refer to **Chapter 5.12** of this Supplemental EIS for BOEM's responses to the NPS's comments on the Draft CPA 247 Supplemental EIS; specifically, refer to the responses to comments NPS-1 and NPS-2 for information about mitigating measures that are applied at the prelease or postlease phases of the OCS oil and gas program to avoid and protect fixed biologically and culturally sensitive features.

Lance R. LeFleur
Director

Robert J. Bentley
Governor

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March 17, 2016

Mr. Gary D. Goeke, Chief
Regional Assessment Section
Office of Environment (GM623E)
Bureau of Ocean Energy Management (BOEM)
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

RE: Gulf of Mexico Outer Continental Shelf (OCS) Oil & Gas Lease Sales
Central Planning Area (CPA) Lease Sale 247, Draft Supplemental Environmental Impact Statement (SEIS)
ADEM Tracking Code: 2016-164-FC-FAA-BOEM-LS

Dear Mr. Goeke:

The Alabama Department of Environmental Management reviewed the BOEM's draft SEIS for the proposed CPA Lease Sale 247 for OCS activities in the Gulf of Mexico.

ADEM-1

Please be reminded that Alabama Governors have consistently opposed sales of leases which are located within 15 miles of the Baldwin County, Alabama Coast. Additionally, the ADEM requests that BOEM require lease holders to provide adequate protection for live bottom areas, pinnacle reefs, chemosynthetic communities, and other sensitive environments while conducting activities in the OCS off Alabama's coast.

Contact Allen Phelps anytime with questions by phone [251] 304-1176 or e-mail at: cap@adem.state.al.us.

Sincerely,

Anthony Scott Hughes, Chief
Field Operations Division

ASH/cap

c: Dr. Berry (Nick) H. Tew, Jr., Geological Survey of Alabama
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ADEM-1 Comment noted. **Chapter 1.1** describes that the purpose of the proposed Federal action is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the OCSLA of 1953 (67 Stat. 462), as amended (43 U.S.C. §§ 1331 *et seq*.). Therefore, blocks located south of and within the first 12 mi (19 km) of Federal waters (refer to **Figure 4-4**) near the GUIS and along the Alabama coastline will remain available for leasing. Protective measures are in place to mitigate the potential impacts to the Gulf Islands National Seashore, the areas south of Baldwin County, and biologically significant bottom-founded marine communities and archeological resources. Coordination requirements are described in the Gulf Islands National Seashore ITL and in the Blocks South of Baldwin County, Alabama, Stipulation found in **Chapter 2.3.1.3.6**. Additional stipulations that are protective of biologically significant, bottom-founded marine communities can be found in **Chapter 2.3.1.3.1** (Topographic Features Stipulation) and **Chapter 2.3.1.3.2** (Live Bottom [Pinnacle Trend] Stipulation).

This ITL ensures that postlease plans submitted by lessees of whole and partial lease blocks within the first 12 mi (19 km) of Federal waters (refer to **Figure 4-4**) near the GUIS are reviewed by BOEM to determine if visual impacts are expected and if any additional mitigative action is required.

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

March 25, 2016

LISA D. JONES
ACTING EXECUTIVE DIRECTOR
STATE HISTORIC PRESERVATION OFFICER

TEL: 334-242-3184
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Mr. Gary Goeke
Public Information Office
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

Re: AHC 2016-0479
Draft Supplemental EIS
Proposed Gulf of Mexico OCS Oil and Gas Lease Sale 241 and 247
Central Lease 226 Eastern
Gulf of Mexico

Dear Mr. Goeke:

ALHC-1

Thank you for the above referenced draft Environmental Impact Statement submission. We look forward to consultation on all proposed actions which would disturbed the sea bottom within Alabama coastal waters.

We appreciate your commitment to helping us preserve Alabama's historic archaeological and architectural resources. Should you have any questions, please contact Amanda McBride at 334.230.2692 or Amanda.McBride@preserveala.org. Have the AHC tracking number referenced above available and include it with any future correspondence.

Sincerely,

Lee Anne Wofford

Lee Anne Wofford
Deputy State Historic Preservation Officer

LAW/AMH/eds

ALHC-1 Comment noted.

JOHN BEL EDWARDS
GOVERNOR

THOMAS F. HARRIS
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

March 31, 2016

Mr. Gary D. Goeke, Chief
Environmental Assessment Section
Office of Environment (GM 623E)
Bureau of Ocean Energy Management (BOEM)
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Via e-mail: cpa247@boem.gov

RE: Comments on the Draft Supplemental Environmental Impact Statement (SEIS) for Proposed Gulf of Mexico Outer Continental Shelf (OCS) Oil & Gas Central Planning Area Lease Sale 247

Dear Mr. Goeke:

The Louisiana Department of Natural Resources, Office of Coastal Management (OCM), has received the Bureau of Ocean Energy Management's (BOEM) Draft SEIS for OCS Lease Sale 247, which updates earlier National Environmental Policy Act (NEPA) documents regarding this Sale. OCM has taken the opportunity to comment on these earlier documents, including:

- Call for Information and Nominations for 10 future offshore oil and gas lease sales in the Central and Western Gulf of Mexico, 2012 – 2017 (April 2011)
- Call for Information and Nominations/Notice of Intent to Prepare an EIS for proposed Eastern Gulf of Mexico Oil and Gas Lease Sales 225 and 226 (January 2012)
- Notice of Availability of a Draft EIS for Gulf of Mexico Proposed Western Planning Area Lease Sales 229, 233, 238, 246, and 248, and Proposed Central Planning Area Lease Sales 227, 231, 235, 241, and 247 (February 2012)
- Notice of Availability of a Draft EIS for Gulf of Mexico OCS Oil and Gas Proposed Eastern Planning Area Lease Sales 225 and 226 (April 2013)
- Notice of Intent to prepare a Supplemental EIS for future OCS Lease Sales 235, 241 and 247, Central Planning Area (November 2013)
- Notice of Availability of a Draft Supplemental EIS for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sales 235, 241 and 247 (April 2014)
- Notice of Intent to prepare a Supplemental EIS for Proposed Central Planning Area Lease Sales 241 and 247, and Eastern Planning Area 226 in the Gulf of Mexico (July 2014)

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Page. 2

- Notice of Availability of a Draft Supplemental Environmental Impact Statement (SEIS) for Proposed Central Planning Area (CPS) Lease Sales 241, and 247 and Eastern Planning Area (EPA) Sale (March 2015)
- Notice of Intent to Prepare a Supplemental Environmental Impact Statement (SIES) for Proposed Gulf of Mexico Outer Continental Shelf (OCS) Oil & Gas Central Planning Area (CPA) Lease Sale 247 (September 2015)

LDNR-1

OCM appreciates the opportunity to offer the following comments regarding the Draft SEIS for Lease Sale 247. BOEM's efforts to more closely examine the cumulative effects of activities resulting from the proposed lease sale still do not adequately address secondary, indirect, and cumulative impacts to Louisiana's coastal zone related to OCS oil and gas activities. Additionally, the state does not concur that impacts from these activities are primarily short term and localized in nature. Louisiana's sensitive coastline bears the brunt of these negative impacts and continues to incur the incremental consequences of OCS activities which, over time, compound to become significant impacts. OCM continues to urge BOEM to direct significantly more effort to identify and quantify the accumulating coastal impacts of OCS lease sales to Louisiana, and make provisions for appropriate compensatory mitigation.

As we approach the end of this five-year cycle of the multi-sale process, OCM acknowledges BOEM, Bureau of Safety and Environmental Enforcement (BSEE), and other resource agencies for their efforts in addressing the many challenges to the protection of the natural resources of the Gulf of Mexico. OCM is committed to the responsible and sustainable use of all of Louisiana's coastal resources and appreciates working with BOEM and the other agencies to that end.

If you have any questions concerning this determination, please contact Jeff Harris of the Interagency Affairs & Field Services Division at (225) 342-7949.

Sincerely yours,

/S/ Don Haydel
Acting Administrator
Interagency Affairs/Field Services Division

DH/SK/jab

cc: Tershara Matthews, BOEM MS 5412
Brian Cameron, BOEM MS 5412
Project folder C20160032

LDNR-1 The concept of compensatory mitigation is rooted in the Council of Environmental Quality's (CEQ) regulations implementing NEPA (40 CFR § 1508.20). Here, the regulations define five types of mitigation, and Secretarial Order 3330 recommends that these methods of mitigation be implemented sequentially. Potential impacts should be identified as potentially having an adverse and long-term effect as a result of Federal OCS oil- and gas-related activities. These potential impacts should first be avoided when possible. The potential impacts that cannot be avoided should be minimized where possible. The remaining potential impacts should then be rectified immediately or, if that is not possible, reduced over time. After these measures, the remaining residual or unavoidable effects may be addressed through compensatory mitigation, if applicable.

Activities that would be appropriate for compensatory mitigation are those that continue to have some level of measurable impact after all other mitigating measures have been applied and for which a beneficial action may be substituted to offset the residual impacts. BOEM has begun to explore ways in which it might incorporate compensatory mitigation into its existing suite of mitigating measures. Implementation of a compensatory mitigation program may require new regulations or stipulations. This would also require coordination with Federal agencies that share jurisdiction offshore, such as BSEE, NMFS, FWS, and the USCG, as well as communication and outreach with State governments, Tribal Nations, nongovernmental organizations, and other stakeholders.

BOEM has included in this Supplemental EIS the relevant information related to its cumulative effects analysis, including both the proposed action and all OCS oil- and gas-related activities in its consideration. As noted in **Chapter 4.1.1**, an individual lease sale would only contribute a small percentage to the overall OCS oil- and gas-related activities and would not significantly change the environmental impacts overall. Many of the impacts to environmental and socioeconomic resources that are identified in the cumulative analysis have occurred over many years, much of it prior to the enactment of important laws to protect the environment and prior to the bulk of OCS oil- and gas-related activities.

JIM BLEVINS
MAYOR

JOE HUFFMAN
CITY MANAGER

EDDIE WILLIAMS
CITY ATTORNEY

THE CITY of Pascagoula
MISSISSIPPI'S FLAGSHIP CITY

CITY COUNCIL

MARIN L. PICKETT, SR.	Councilman, Ward 1
FREDDY JACKSON	Councilman, Ward 2
DAVID TADLOCK	Councilman, Ward 3
BURTON HILL	Councilman, Ward 4
SCOTT TIPTON	Councilman, Ward 5
BRENDA SIMKINS	Councilman at Large

603 WATTS AVE. • P.O. DRAWER 908
PASCAGOULA, MS 39568-0908 • TELEPHONE 228-762-1020

April 11, 2016

RE: Central Planning Area Lease Sale 247 Supplemental EIS

To Whom It May Concern:

Pascagoula's waters are the source of its livelihood as a community. They are used for recreation and commerce, and are the habitat to abundant marine life and serve as a food source to our birds. We feel strongly that opening the door to further oil exploration would bring about adverse effects on the tourism and seafood industries as well as the quality of life in Pascagoula.

Pascagoula has the deepest water on the Mississippi Gulf Coast, which makes our community one of the best spots for fishing. We welcome charters from all over, as well as many commercial fishing vessels. Additionally, a large portion of Pascagoula's permanent residents are boat owners and recreate in the Gulf waters.

Oil exploration would render these recreational areas unsafe for swimming and boating, and would create limitations for fishing. Furthermore, oil exploration would result in the release of chemical emissions in the air and water that are unsafe for marine life and birds.

Pascagoula is actively working to establish itself as an eco-tourism destination with abundant opportunities for birding, fishing, kayaking, and more. It would bring all of those efforts to a halt if the shoreline becomes the site of cranes, rigs, and smokestacks.

CP-1 For the reasons listed above and on behalf of many concerned residents, we urge the Bureau of Ocean Energy Management to opt for Alternative C, to take no action on the proposed CPA Lease Sale 247. We understand that there would be no opportunity to develop gas believed to be under the surface, but we believe that the environmental risks and the negative potential consequences outweigh the economic gains.

Respectfully submitted,

Anne Pitre
Public Relations Specialist

CP-1 Comment noted.

CPA247, BOEM <cpa247@boem.gov>

Comments on the Draft CPA 247 Supplemental EIS

1 message

ManaSota-88 <manasota88@comcast.net> Sat, Feb 27, 2016 at 10:02 AM
To: cpa247@boem.gov

Mr. Gary D. Goeke, Chief 2/27/2016
Environmental Assessment Section
Office of Environment (GM 623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, Louisiana 70123-2394

Sent via email to cpa247@boem.gov

Re: Comments on the Draft CPA 247 Supplemental EIS

Dear Mr. Goeke:

MS-1 ManaSota-88 recommends exclusion of all areas of the Central Planning Area (CPA) 247 for any new oil and gas leasing areas for the OCS Gas and Oil Leasing Program for 2012 - 2017.

ManaSota-88 recommends that all lease sales remaining for the CPA scheduled be canceled.

ManaSota-88, Inc. (ManaSota-88) is a public interest environmental and public health organization incorporated under the laws of the State of Florida as a not-for-profit corporation. The membership of ManaSota-88 consists of citizens and residents of Florida, including residents living or working in Manatee and Sarasota County. Members of ManaSota-88 use and enjoy the waters of the Gulf of Mexico, which is the subject of the OCS 2012 - 2017 Lease Program.

ManaSota-88 finds no reason to believe the current OCS Leasing Program will protect Florida's economy and environment from the potential serious environmental damage associated with offshore oil drilling.

Oil drilling will place the Central Gulf of Mexico, an area of high environmental sensitivity and marine productivity, at risk. Presently the region supports numerous species of wildlife, major commercial and recreational fisheries and several species of endangered animals.

MS-2 Extensive environmental studies are required before offshore oil drilling can be permitted. Existing scientific data is incomplete and outdated due to the long term environmental impacts from the Deepwater Horizon oil spill.

MS-3 The Mineral Management Service (MMS) currently uses a "best guess management" policy regarding drilling safety as it relates to the public's health and the environment.

Without adequate data, the environmental trade-offs and cost/risk analysis required prior to granting oil and gas leases will result in the continued use of the present MMS "best guess management" policy.

MS-4 There is no evidence to indicate that mitigation measures exist to reduce the significant adverse environmental impacts associated with offshore oil drilling. Until the technology exists to prevent further economic and environmental damage, expanded drilling should not be permitted in the Gulf of Mexico.

Significant Issues for the CPA 247

1. Cumulative Impact Analyses

Environmental concerns with regard to OCS leasing activities center around oil spills, pipelines, chronic impacts resulting from routine discharges of drilling fluids, and onshore impacts.

MS-5 Offshore oil and gas drilling permits and transportation and refinery operation permits must be linked for cumulative impact analysis. This currently is not being done.

MS-6 Not enough is known about the value and sensitivity of live bottom areas of the Gulf of Mexico to permit additional leasing of areas for exploration and development activities.

MS-7 Previous EIS's have not adequately evaluated the long or short term biological effects of areas contaminated from oil-spills.

MS-8 The EIS for the Oil and Gas Leasing Program must make it quite clear that information regarding environmental and public health impacts is lacking. Previous OCS Oil and Gas Leasing EIS's are not in conformity with the National Environmental Policy Act (NEPA).

MS-9 Onshore water quality degradation routinely occurs as a result of increased non-point and point sources of pollution, especially in those areas along Florida's west coast where water quality problems already exist (Perdido, Escambia, Hillsborough and Tampa Bay). Point source pollution increases also occur from effluent discharges related to OCS support activities.

MS-10 In addition to pipeline blowouts or leaks causing serious environmental problems, laying pipes from offshore will also cause increased turbidity of surface waters, destruction of sea grass beds and resuspension of contaminated sediments.

MS-11 The overall impact of oil and gas activities seriously affects aquatic preserves and submerged lands under state jurisdiction to protect marine habitats, oyster beds, marshes and mangroves.

2. Fair Market Value Options

The approach of the current OCS Leasing Program has been an economic and environmental failure.

MS-12 The Minerals Management Service depends heavily upon the oil industry to perform an evaluation of the resources available and to report the full value of the deposits to be leased to the Department of Interior (DOI). Resource estimates have been so highly inaccurate that they are meaningless. To depend upon such information is to depend upon the same irresponsible premise that the oil industry will fully identify the amounts and values of mineral resources under their DOI contracts. Therefore, the MMS will never be able to properly comply with the cost/risk analysis required.

MS-13 The present "generic" approach to OCS leasing has leased far too much submerged land in the Gulf of Mexico for exploration. As a result, the MMS has not been able to adequately monitor for and control the environmental degradation resulting from offshore leasing activities.

The large size of the current oil and gas leases in the Gulf of Mexico means the federal government is not realizing a proper financial return from the sale.

MS-14 The OCS Leasing Program has not provided the best opportunity to bring about the lowest level of environmental consequences and thwart the tendency of the oil industry to lease more land than it can explore and develop. There is no need to expand existing leasing activities.

90 million acres of federal lands are currently leased to oil companies. Less than a quarter of these lands are being used for oil and gas production. Flooding the market with huge area-wide offshore oil leases will drive down the price of oil and gas leases and reduce competition. The American taxpayers will loose out on billions of dollars of oil revenues. The glut of oil leases already offered has provided the oil industry an opportunity to lease large blocks of submerged lands at bargain basement prices.

3. Potential Impacts to Tourism and Recreation Activities

Florida's economy is based on having clean beaches and a healthy environment, not oil refineries, storage tanks, oil platforms and pipelines.

Tourism employs about 1 million people living in Florida. Tourism generates about $65 billion-a-year for the state of Florida.

MS-15

Whatever oil revenues are realized is small when compared to the cost in damage one oil spill will have on Florida's economy, environment and job employment.

A proper economic assessment of offshore oil drilling can only be made when the following are considered: costs of the loss of recreation and tourism dollars, the irretrievable commitment of chemicals used in the separation and processing of oil and gas; the hazards associated with transportation of hazardous and volatile chemicals associated with oil exploration and processing, the increased costs associates with reduced national security, the costs of the health impacts associated with increased air and water pollution, and the costs of the unavoidable impacts to the Gulf Coast.

4. Accidental Oil Spills

MS-16

The fact is oil that reaches wetlands and estuaries near the Gulf Coast will render the area uninhabitable to plants and animals. Oil will remain for years, destroying the eggs and larvae of marine organisms, adversely impacting waterfowl, and completely destroying or disrupting the food chain. Marine life will be affected in a myriad of poorly understood ways; smothering bottom dwellers and subtly changing marine and shoreline ecosystems. Large accidental oil spill impacts have never been adequately addressed in previous Environmental Impact Statements.

MS-17

Crude oil spills or blowouts pose a serious threat to a variety of shorelines along the Gulf Coast. Included among the shorelines are sandy beaches, wetlands and mangroves. Oil slicks can and will penetrate into marshes and mangroves, causing a more pervasive and persistent impact in the interior of such areas. Furthermore, designated environmental preservation areas, such as aquatic preserves and estuarine and marine sanctuaries, extend into sub tidal and intertidal areas where important natural features such as shellfish beds, sea grasses, rock outcroppings and coral reef communities exist.

5. Ecological Impacts From Potential Degradation Of Marine And Coastal Habitats

Coastal water impacts occur with routine oil and gas drilling activities such as an increase in turbidity resulting from pipeline installation, navigation canal maintenance, the discharge of drilling muds, the increased concentrations of some metals, hydrocarbons, and dissolved solids within the drilling area adjacent to the point of discharge, and the marine water impacts resulting from supply and service-vessel bilge and ballast water discharges.

MS-18

Drilling in marine and coastal environments can have devastating impacts. Petroleum hydrocarbons are extremely toxic to a wide variety of marine organisms at very low concentrations. In addition to direct lethal effects, petroleum hydrocarbons can exert sub lethal effects, including reduced growth, altered feeding behavior, and lower reproductive success. Oil spilled in sheltered lagoons and wetlands may persist in sediments for decades, where it can continue to exert negative effects on benthic organisms.

6. Hurricanes

Florida perhaps faces a greater potential for the occurrence of natural hazards than any other state. Florida ranks first in hurricane occurrences and is the most vulnerable to the devastating effects resulting from coastal storms.

MS-19

Hurricanes can and have caused oil spills.

The U.S. Government's Minerals Management Service states that Hurricanes Katrina and Rita damaged or destroyed 113 oil platforms, 457 oil pipelines and caused 124 offshore oil spills in the Gulf of Mexico. More than 9,000,000 gallons of oil were spilled from onshore tanks and pipelines as a result of the two storms. The U.S. Coast Guard reported that there were over 9 million gallons of oil released from six major and five medium spills.

There is no reason to believe that future oil drilling will protect the Gulf Coast's economy and environment from the potentially serious environmental damage associated with offshore oil drilling and onshore oil spills associated with hurricanes.

7. Seagrass Communities

MS-20 Oil spills occurring near a seagrass community will require long term cleanup and the impacts will be permanent in nature. Spilled oil causes lethal and sub-lethal effects in benthic organisms in seagrass communities.

Turbidity impacts from pipeline installation and maintenance dredging, anchoring, infrastructure and pipeline emplacement, infrastructure removal, drilling discharges, and produced-water discharges negatively impact sea grasses.

8. Chemosynthetic and Nonchemosynthetic Communities

MS-21 These communities are susceptible to physical impacts from structure placement, anchoring, and pipeline installation associated with shallow and deep well drilling. Damage to the ecological functions of deep-sea benthic communities can be expected if additional drilling is allowed. Environmental destruction will be difficult if not impossible to recover due to the depths deep-sea communities are located at. Little to no base-line data exists concerning these communities in the Gulf of Mexico.

9. Sea Turtles

MS-22 All five species of sea turtles exist within Gulf of Mexico and the Florida Straits. Negative impacts from routine activities and accidental spills will affect sea turtles due increased exposure to hydrocarbons resulting in lethal and/or sub lethal impacts.

The routine activities of shallow and deep well drilling will have significant adverse impact on the size and recovery of any sea turtle species or population living in the Gulf of Mexico.

Hydrocarbons persisting in the Gulf of Mexico following the dispersal of an oil slick will result in sub-lethal impacts for years.

10. Onshore Health and Environmental Impacts

MS-23 Oil and gas operations require roads, storage tanks, pipelines, processing facilities, and other industrial facilities. These can severely damage beaches, wetlands, and coastal habitats, with consequences for coastal economies that depend on tourism, recreation and fishing.

MS-24 Oil and gas processing plants can result in the degradation of air quality. Onshore gas processing activities typically emit constant levels of volatile organic compounds, nitrogen oxides, carbon monoxide, sulfur dioxide and total suspended particulates.

Processing and oil separation require large volumes of water.

11. Coastal and Marine Birds

MS-25 Routine oil and gas drilling operations can impact endangered or threatened bird species such as the piping plover, whooping crane, and brown pelican by causing changes in behavior, exposure to or intake of oil contaminants, ingestion of discarded debris, temporary and permanent displacement of bird populations and permanent impacts on their food supply.

12. Fish Resources and Essential Fish Habitat (EFH)

A purpose of the Magnuson-Stevens Act is: "to promote the protection of essential fish habitat in the review of projects conducted under Federal permits, licenses or other authorities that affect, or have the potential to affect such habitat."

MS-26 Sustainable Gulf of Mexico fisheries has declined, recovery of threatened or endangered species is not occurring, and the health of marine and anadromous fish habitats continues to degrade. Pollution of water resources, degradation of important marine habitats, and habitat loss continue at an unacceptable rate in the Gulf Coast states.

The Gulf Coast is home to hundreds of fish species. In addition, these fish support commercial and recreational fishing industries that bring substantial revenues to the state and coastal communities.

MS-27 Fish resources and EFH will be impacted by coastal environmental degradation, marine environmental degradation, pipeline trenching, and offshore discharges of drilling discharges and produced waters associated with routine activities.

13. Offshore Environmental Impacts

MS-28 In addition to pipeline blowouts or leaks causing serious environmental problems, laying offshore pipes will cause increased turbidity of marine waters, destruction of seagrass beds and resuspension of contaminated sediments. Fish resources will be impacted by coastal and marine environmental degradation, pipeline trenching, and offshore drilling discharges associated with routine oil and gas drilling operations.

MS-29 Seismic surveys require the use of air guns, which use explosive blasts to map rock formations on the sea floor. Sound from these underwater blasts can be detected for thousands of miles. Seismic testing can have profound, even fatal effects.

Conclusion

MS-30 The oil and gas industry should not be permitted to externalize the costs of the air, water and land pollution they create at the expense of the environment and the public's health. Onshore refinery and offshore drilling permits need to be linked together in the review and issuance of oil and gas permits.

MS-31 Finally, as we have stated, previous oil and gas leasing Environmental Impact Statements for the OCS have been inadequate and if leasing is permitted to proceed, we fear there can be serious public health, economic, and environmental consequences above and beyond what is currently happening with the Deepwater Horizon oil spill, including damage to the tidal marshes, our coastal sea grasses, forested and non-forested wetlands, and mangroves.

Glenn Compton - Chairman
ManaSota-88, Inc.
P.O. Box 1728
Nokomis, Florida 34274
http://www.manasota88.org

MS-1 The purpose of the proposed Federal action is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the OCSLA (67 Stat. 462), as amended (43 U.S.C. §§ 1331 *et seq.*). The OCSLA provides the Congressional mandate for BOEM to make "available for expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs" the lands of the Federal OCS. The decision to cancel a lease sale, considered in this Supplemental EIS as the No Action alternative, is under the authority of the Assistant Secretary for Land and Minerals Management.

MS-2 BOEM's Environmental Studies Program continues to participate in and fund studies of OCS lands and resources. **Chapter 1.3.1.1** provides a listing of the most recent studies that were completed since the previous CPA 241/247 and EPA 226 Supplemental EIS, and it also directs the reader to Appendix E of the CPA 235/241/247 Supplemental EIS, which provides a listing of new BOEM studies completed between 2006 and 2013.

In addition to studies prepared through BOEM's Environmental Studies Program, BOEM's technical staff utilizes new and updated information available through peer-reviewed scientific studies and reports prepared by Federal agencies, including studies published as part of the NRDA process that evaluated the possible effects of the *Deepwater Horizon* explosion, oil spill, and response. For example, information from recent NRDA studies that evaluated the possible effects to the health of bottlenose dolphins exposed to oiling was incorporated into the impact assessment prepared for this Supplemental EIS. While other studies associated with the NRDA process remain incomplete, the results of future NRDA studies will be incorporated into the impact assessments for future EISs prepared by BOEM.

BOEM follows CEQ guidelines when preparing EIS documents. The CEQ's "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act" under 40 CFR § 1502.22, "Incomplete or unavailable information," provides guidance to Federal agencies when evaluating the reasonably foreseeable significant adverse impacts on the human environment in an EIS. The guidance requires that, if information is incomplete or unavailable, the lack of the information be acknowledged in the EIS, as well as a statement as to the relevance of the incomplete or unavailable information and a statement as to the cost of obtaining the information (exorbitant or not exorbitant). Additionally, if costs are determined to be exorbitant or if the means to obtain the information are not known, then the agency shall include additional information as to the relevance of the information in evaluating significant adverse impacts and the other approaches and methodologies the agency used to assess the impacts. In accordance with CEQ's regulations, incomplete or unavailable information has been identified for a number of resources evaluated in this Supplemental EIS.

MS-3 Drilling safety is a high priority for BOEM and the BSEE, and a series of enhancements to drilling safety have been implemented in the years since the *Deepwater Horizon* explosion, oil spill, and response. Regulatory changes that have been implemented since the *Deepwater Horizon* explosion, oil spill, and response were summarized in Chapter 1.3.1 of the 2012-2017 WPA/CPA Multisale EIS. Updates to the regulatory reforms have been presented in subsequent Supplemental EISs. Additional information can be found in **Chapter 1.3.1** of this Supplemental EIS and on BOEM's website at http://www.boem.gov/Reforms-since-the-Deepwater-Horizon-Tragedy/.

MS-4 BOEM applies mitigating measures to a variety of OCS oil- and gas-related activities to ensure that operations are conducted in an environmentally sound manner. Mitigating measures may be commonly or universally applied. For a listing of commonly applied mitigating measures, refer to Appendix A of the CPA 241/247 and EPA 226 Supplemental EIS. Refer to **Chapter 2.2.2.2** of this Supplemental EIS for a discussion of existing mitigating measures. Many mitigating measures are recurring and are identified as "standard." These standard mitigating measures are developed in advance and may be

applied whenever conditions warrant. In addition to standard mitigations, BOEM may apply nonrecurring mitigating measures that are developed on a case-by-case basis. BOEM is continually revising mitigating measures and how they are applied and tracked for all of the Gulf of Mexico OCS Region to more easily and routinely track mitigation compliance and effectiveness.

MS-5 Chapter 3.1 of the 2012-2017 WPA/CPA Multisale EIS provides detailed descriptions of the impact-producing factors and scenario for routine operations, including refineries, exploration and delineation plan and drilling, development and production drilling, and offshore transport (Chapters 3.1.2.1.4.1, 3.1.1.2.2, 3.1.1.3.1, and 3.1.1.8 of the 2012-2017 WPA/CPA Multisale EIS, respectively). These impact-producing factors are used in the cumulative impacts analyses for environmental and socioeconomic resources, which are described in detail in Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS.

MS-6 Refer to Chapter 4.2.1.6 ("Live Bottoms") of the 2012-2017 WPA-CPA Multisale EIS for a detailed discussion of live bottoms in the GOM and of BOEM's stipulations and case-by-case reviews of plan and pipeline applications used to protect these features from impacts of routine offshore oil and gas activity.

MS-7 **Chapter 4.1 and Appendix B** of this Supplemental EIS and Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS describe the impacts of oil spills on marine and coastal resources. In addition, the 2012-2017 WPA/CPA Multisale EIS and this Supplemental EIS note the potential changes to the environmental baseline from spills, particularly from the *Deepwater Horizon* oil spill. This Supplemental EIS acknowledges that there is incomplete or unavailable information related to the possible effects of the *Deepwater Horizon* explosion, oil spill, and response.

MS-8 In response to the *Deepwater Horizon* explosion, oil spill, and response, a major NRDA is being conducted to access the impacts to all natural resources in the GOM that may have been impacted by the resulting spill from the *Macondo* well, as well as impacts from the spill-response operations. **Chapter 4.1.1.23.4** ("Environmental Justice") of this Supplemental EIS discloses that long-term health impact studies and subsistence studies are incomplete. Although this information is currently not available, BOEM determined that the incomplete information was not essential to a reasoned choice among alternatives.

MS-9 **Chapter 4.1.1.2.1** of this Supplemental EIS describes the primary impacting sources to coastal waters "as point-source and storm-water discharges from support facilities, vessel discharge, and nonpoint-source runoff." The full analyses of the potential impacts of routine activities to coastal waters is described in Chapters 4.2.1.2.1.2 and 4.2.1.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS. The potential for OCS oil- and gas-related activities to affect the onshore water quality of the west coast of Florida is very low since almost no OCS oil- and gas-related activities occur in that region.

MS-10 As described in **Chapter 4** of this Supplemental EIS and Chapter 4 of the 2012-2017 WPA/CPA Multisale EIS, BOEM acknowledges that there may be impacts from pipeline laying, though this is expected to be temporary and minimized by both site-specific mitigations and the economic incentives to tie into the existing pipeline network, rather than to run new pipelines onshore.

MS-11 In keeping with its obligations under NEPA, BOEM considers the potential impacts of the CPA proposed action and the OCS oil and gas program to all relevant resources, including those under State jurisdiction and inshore of OCS lands (e.g., coastal waters, coastal barrier beaches and associated dunes, wetlands, and others found in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS). In addition, there are State and Federal laws and regulations (e.g., those implementing the Clean Water Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Coastal Zone Management Act) administered by

other agencies, but under which BOEM-regulated activities must also comply, that minimize or avoid reasonably foreseeable effects of oil and gas activities in marine and coastal habitats.

MS-12 The oil and gas resources on the OCS belong to the people of the United States, who, through their Government, lease the right to explore and develop those resources. The Federal Government, through BOEM and the BSEE, issues permits for prelease exploration activities, independently evaluates oil and gas resources and reserves, leases acreage, performs environmental assessments, and regulates drilling and production activities. The OCSLA, which was passed by Congress in 1953 and amended in 1978, is the basis for many of the procedures and activities carried out by BOEM and the BSEE.

Resource assessment and estimation is independently carried out by BOEM's Office of Resource Evaluation. The scale of assessment activities ranges from large regional studies (basin) to the lease sale-specific individual prospect through the development and production of the field and reservoir. The Office of Resource Evaluation's program utilizes geophysical (seismic), geological, engineering, and economic data to identify geologic plays on the OCS that offer the highest potential for natural gas and oil exploration, development, and production. An assessment of the play's undiscovered resource potential and its economic viability is made using state-of-the-art geologic and economic models. This information is provided to the public and is used in the development of the Five-Year Program and EISs, and to support decisions made by the U.S. Department of the Interior.

Once a lease sale area has been identified, in accordance with the Five-Year Program, the Office of Resource Evaluation will focus on detailed mapping and analyses that are needed to more accurately estimate the resource potential of an individual prospect. BOEM follows specific bid adequacy procedures to ensure that the Government receives fair market value for the blocks receiving bids. This process is carried out in several phases and incorporates geological and geophysical data, along with reserve, resource, engineering, and economic information into a sophisticated discounted cash flow computer model. The goal of that model is to achieve independent estimates of the fair market value for the blocks receiving bids. BOEM does not rely on estimates from the oil industry.

BOEM is required to conduct a continuing investigation of oil and gas reserves after wells are drilled and throughout the lifespan of an oil and gas field to determine the availability of all oil and gas produced or located on the OCS. To meet this requirement, BOEM develops independent estimates of economically recoverable amounts of oil and gas contained within discovered fields by conducting field reserve studies. The reserve estimates are revised periodically to reflect new information obtained from development and production activities. Reserve studies are critical inputs to resource assessments, the review and approval of royalty relief applications as analogs for bid adequacy determinations, and the review of industry plans and requests. The geologic and engineering information also supports other program activities within DOI and cooperative efforts with the U.S. Department of Energy and its Energy Information Administration.

MS-13 Location and size of the area considered for lease are determined by the configuration of the three OCS planning areas in the Gulf of Mexico, i.e., the WPA, CPA, and EPA. Planning areas consist of smaller, named protraction areas (e.g., Walker Ridge), which in turn are divided into blocks. There are multiple standard block sizes in the Gulf of Mexico; however, most blocks are 5,760 ac, and none of the blocks are greater than this. International blocks are typically 10-500 times the size of Gulf of Mexico OCS lease blocks.

The BSEE, in coordination with BOEM's Office of Environment, oversees various research efforts and assists in the field monitoring of potential environmental degradation that could result from the OCS Program. In the Gulf of Mexico OCS Region, the BSEE's Environmental Enforcement Branch participates in or oversees real-time observation efforts during various OCS operations to monitor for the potential impacts to protected species,

fish/fisheries, and benthic ecosystems; conducts routine inspections on OCS facilities and MODUs to monitor emissions and discharges related to air and water quality; and conducts environmental compliance activities targeted at specific OCS oil- and gas-related activities.

Section 18(a)(4) of the OCSLA states that "Leasing activities shall be conducted to assure receipt of *fair market value* for the lands leased and the rights conveyed by the Federal Government." Lessees pay bonuses, rentals, and royalties reflecting the value of the rights to explore and potentially develop and produce OCS oil and gas resources. BOEM sets minimum bid levels, rental rates, and royalty rates by individual lease sales based on its assessment of market and resource conditions as the lease sale approaches. BOEM has used a two-phase postsale bid evaluation process to meet the fair market value requirement. This bid adequacy process relies on evidence of market competition and in-house estimates of tract value. In addition to the lease fiscal terms and bid adequacy process, BOEM establishes terms and conditions to assure diligent and environmentally sound development of leases.

MS-14 Not all leases/tracts are the same; the subsurface geology beneath each lease/block is different. Therefore, some leases are more prospective for oil and gas exploration, development, and production than others. Industry bids on the blocks that they believe are prospective and can generate a future economic return.

Refer to the response to comment MS-13 for information on the financial returns from the proposed lease sale, as well as environmental monitoring and protection.

MS-15 An economic analysis of the costs and benefits of leasing in the Gulf of Mexico is presented in Chapter 2.12 of the Five-Year Program EIS. The cost-benefit analysis incorporates the environmental and social costs associated with substituted energy resources. The net benefits analysis includes the social and environmental costs of reasonably foreseeable oil spills, but the results do not directly include cost of a catastrophic discharge event, which is not expected to occur as a result of the proposed action.

MS-16 The potential impacts from both routine activities and accidental events, including oil spills to coastal areas and resources, are discussed in **Chapters 4.1.1.3, 4.1.1.4, and 4.1.1.5** (i.e., coastal barrier beaches and associated dunes, wetlands, and seagrass communities), respectively. Potential impacts of a catastrophic oil spill on these same resources, which is not part of the CPA proposed action and not likely expected to occur, are discussed in **Chapters B.3.1.3, B.3.1.4, and B.3.1.5 of Appendix B**.

MS-17 Refer to the response to comment MS-16.

MS-18 The properties and persistence of different types of oils are described in Table 3-7 of the WPA 233/CPA 231 Supplemental EIS. **Chapter 4.1** of this Supplemental EIS and Chapter 4.2 of the 2012-2017 WPA/CPA Multisale EIS contain information describing the effects of oil spills and petroleum hydrocarbons on various marine resources.

The potential impacts from both routine activities and accidental events, including oil spills to coastal areas and resources, are discussed in **Chapters 4.1.1.3, 4.1.1.4, and 4.1.1.5** of this Supplemental EIS (i.e., coastal barrier beaches and associated dunes, wetlands, and seagrass communities) and Chapters 4.2.1.3, 4.2.1.4, and 4.2.1.5 of the 2012-2017 WPA/CPA Multisale. Potential impacts of a catastrophic oil spill on these same resources, which is not a part of the CPA proposed action and not likely expected to occur, are discussed in **Chapters B.3.1.3, B.3.1.4, and B.3.1.5 of Appendix B** of this Supplemental EIS and Appendix B of the 2012-2017 WPA/CPA Multisale EIS (USDOI, BOEM, 2016).

For a detailed discussion of impacts to benthic organisms, refer to **Chapters 4.1.1.6, 4.1.1.7, 4.1.1.9, 4.1.1.10, and 4.1.1.11** of this Supplemental EIS and Chapters 4.2.1.6, 4.2.1.7, 4.2.1.9, 4.2.1.10, and 4.2.1.11 of the 2012-2017 WPA/CPA Multisale EIS.

MS-19 Comment noted. Chapter 3.1.1.7.4.1 of the 2012-2017 WPA/CPA Multisale EIS discusses the causes of spills and volume from a 10-year period (1998 through 2007). It also acknowledges the association between hurricanes and platform spills and between hurricanes and pipeline spills. **Chapter 1.3.1.1** of this Supplemental EIS provides information related to NTL 2015-BSEE-G02, "Hurricane and Tropical Storm Effects Reports," and Chapter 1.5 of the 2012-2017 WPA/CPA Multisale EIS discusses emergency plans and facility shut-ins as a result of severe weather events.

MS-20 Oil spills have the potential to change community structure, decrease growth rates, cause death or cause a decline in ecological services by seagrass communities of the CPA if an accidental event were to occur in close proximity to these habitats. **Chapter 4.1.1.5** of this Supplemental EIS and Chapter 4.2.1.5.3 of the 2012-2017 WPA/CPA Multisale EIS provide descriptions of other accidental events on seagrass communities, such as cleanup activities and recovery following oil spills.

MS-21 Knowledge about deep-sea benthic communities is continuing to evolve. BOEM continues to fund studies to provide information on deepwater Gulf of Mexico habitat and biological communities. A BOEM-funded study that is currently underway in the Gulf of Mexico is "Exploration and Research of Northern Gulf of Mexico Deepwater Natural and Artificial Hard Bottom Habitats with Emphasis on Coral Communities: Reefs, Rigs, and Wrecks." BOEM also maintains a large database of chemosynthetic communities, nonchemosynthetic communities, and seafloor features, which are often associated with such communities. This database is being continually updated as bottom surveys, whether from scientific studies or associated with OCS oil- and gas-related activity, become available.

The application of avoidance criteria for chemosynthetic communities and other biologically sensitive areas in water depths ≥300 m (984 ft) is described in NTL 2009-G40. This NTL precludes the placement of a well within 610 m (2,001 ft) of any suspected site of a chemosynthetic or deepwater coral community. This NTL further describes the required distances of at least 250 ft (76 m) from the location of all other proposed seafloor disturbances (including those caused by anchors, anchor chains, wire ropes, seafloor template installation, and pipeline construction). These requirements limit the impacts of OCS oil- and gas-related activities to chemosynthetic and nonchemosynthetic communities. Additional guidance for avoiding biologically sensitive areas found in water depths <300 m (984 ft) is described in NTL 2009-N39. Refer to **Chapters 4.1.1.6, 4.1.1.7, 4.1.1.9, 4.1.1.10, and 4.1.1.11** of this Supplemental EIS and Chapters 4.2.1.6, 4.2.1.7, 4.2.1.9, 4.2.1.10 and 4.2.1.11 of the 2012-2017 WPA/CPA Multisale EIS for information regarding the impacts to chemosynthetic and other biologically sensitive underwater communities.

MS-22 The potential impacts from both routine activities and accidental events, including oil spills, to sea turtles are described in **Chapter 4.1.1.13**. As outlined in this Supplemental EIS, "routine activities related to the CPA proposed action are not expected to have long-term adverse effects on the size and productivity of any sea turtle species or populations in the northern Gulf of Mexico." Chapter 4.2.1.13 of the 2012-2017 WPA/CPA Multisale EIS also describes the impacts of these types of activities on sea turtles. The potential impacts of a catastrophic oil spill on sea turtles, which is not a part of the CPA proposed action and not likely expected to occur, can be found in **Chapter B.3.1.13 of Appendix B**.

MS-23 BOEM projects 0-1 new gas processing facilities and 0-1 new pipeline landfalls for the CPA proposed action. It is important to point out that BOEM only permits infrastructure emplaced on the OCS. Infrastructure constructed on onshore coastal areas are regulated and permitted by the States pursuant to their CZM programs and by other Federal agencies pursuant to

various other statutes, such as the Clean Water Act and the Clean Air Act (Cameron and Matthews, 2016). Mitigation for onshore impacts can be and is frequently required. Refer to **Chapter 4.1** of this Supplemental EIS and Chapter 4.2 of the 2012-2017 WPA/CPA Multisale EIS for information regarding the potential impacts of onshore infrastructure related to the CPA proposed action.

MS-24 Refer to the response to comment MS-23 and to **Chapter 4.1.1.1** of the Supplemental EIS and Chapter 4.2.1.1 of the 2012-2017 WPA/CPA Multisale EIS for air quality analyses.

MS-25 Refer to **Chapter 4.1.1.6** of this Supplemental EIS and Chapter 4.2.1.16.2 of the 2012-2017 WPA/CPA Multisale EIS for a discussion of the potential impacts to coastal and marine birds (threatened or endangered as well as nonthreatened or nonendangered species).

MS-26 Comment noted. The baselines for these resources are described under the headings "Affected Environment" in **Chapter 4.1** of this Supplemental EIS and Chapter 4.2 of the 2012-2017 WPA/CPA Multisale EIS. Managed stocks are further discussed and analyzed in the EFH Assessment (Appendix D of the 2012-2017 WPA/CPA Multisale EIS), which BOEM does as part of the EFH consultation with the NMFS.

MS-27 Comment noted. Potential impacts from these types of activities are analyzed and discussed in **Chapter 4.1.1.18** of this Supplemental EIS and Chapter 4.2.1.18 of the 2012-2017 WPA/CPA Multisale EIS. Managed stocks are further discussed and analyzed in the EFH Assessment (Appendix D of the 2012-2017 WPA/CPA Multisale EIS), which BOEM does as part of the EFH consultation with the NMFS.

MS-28 Comment noted. The potential impacts described in this comment are analyzed and discussed in **Chapters 4.1.1.5 and 4.1.1.18** of this Supplemental EIS and Chapters 4.2.1.5 and 4.2.1.18 of the 2012-2017 WPA/CPA Multisale EIS.

MS-29 Comment noted. Refer to **Chapters 4.1.1.12, 4.1.1.13, and 4.1.1.19** for information regarding the potential impacts of seismic surveys on marine mammals, sea turtles, and commercial fisheries. While seismic survey-related noise was determined to have the potential to harm or harass marine mammal species, the noise is not expected to have long-term impacts on the size and productivity of any marine mammal species or population (**Chapter 4.1.1.12**). Mitigations that are specifically related to sound impacts, such as those described in NTL 2012-JOINT-G02 ("Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program"), reduce the risk of harassing or harming mammal species. The noise generated during seismic surveys was also determined to have the potential to disturb sea turtles (**Chapter 4.1.1.13**) and commercial fisheries (**Chapter 4.1.1.19**). Additional information about commonly applied mitigating measures can be found in Appendix A of the CPA 241/247 and EPA 226 Supplemental EIS.

MS-30 BOEM does consider the construction of infrastructure in the resource analyses in **Chapter 4.1** of this Supplemental EIS and Chapter 4.2 of the 2012-2017 WPA/CPA Multisale EIS. Refer to the response to comment MS-23 for information regarding the projected infrastructure construction associated with the proposed CPA lease sale. Additionally, no new refineries are expected to be constructed as a result of the CPA proposed action.

MS-31 Refer to the responses to comments MS-7, MS-16, MS-18, and MS-20.

BB-1

MS. ROLFES:

Yeah, you're good at that. Two for two. Yes. That's exactly right my name is Anne Rolfes, and I'm with the Louisiana Bucket Brigade from here in New Orleans, and I echo what Monique just said is that we're calling for an end to new leases in the Gulf of Mexico and have submitted a request already to President Obama to cancel the most immediate auction on the 23rd, which is coming up, and we'll certainly ask him to cancel this auction as well.

Anybody who saw the BP disaster understands that this industry doesn't have a handle on its operations, but even beyond the day-to-day operations, this is -- the carbon that this would burn would melt our planet, so the Environmental Impact Statement doesn't really need to be too complex. We've had enough. Enough is enough. We're advocating and calling on the President and the Department of the Interior to cancel this auction.

Thanks.

MS. NORD:

Thank you. Okay. The last speaker that we have on our list is Ruth Breech.

MS. ROLFES:

She's outside. She's outside, I think, on the phone, so if you have other things that you're supposed to do, I'll go get her.

MR. GOEKE:

We're about to take a short break, and we can catch her after the break.

MS. NORD:

So we'll take a 15-minute break and wait for our next speaker to come on, and, again, if anybody else would like to get on the list to submit comments, this would be an opportunity to do that right now.

(Off the record.)

MS. NORD:

Okay. So we had one additional speaker, and I was going to

For Immediate Release: March 16, 2016

Contact: Anne Rolfes, Louisiana Bucket Brigade, (504) 452-4909, anne@labucketbrigade.org

Federal Hearing Met with Demand for No New Drilling Leases in the Gulf of Mexico

NEW ORLEANS — For the first time ever, hundreds of Gulf Coast residents are joining forces with local and national environmental and social justice groups to oppose a federal offshore fossil fuel lease sale in the Gulf of Mexico. While the groups and hundreds of people will convene at next week's auction of oil leases at the Superdome, representatives of the group will make the demand to cancel plans for all new leases at a public hearing today.

The Bureau of Ocean Energy Management (BOEM) is holding a public hearing today regarding the environmental impact of the proposed auction, to be held next year. According to the agency's announcement, "BOEM is proposing to offer for oil and gas leasing approximately 47.4 million acres of the total 66.45 million acres" in the central planning area. Link to the announcement: http://www.boem.gov/CPA-247-Special-Information-Notice-NOA/

BB-2

A coalition of groups is sending a letter to President Obama requesting the cancellation of leases for new drilling in the Gulf of Mexico. The letter, signed by 47 groups, states that sales of publicly owned fossil fuels contribute significantly to global carbon emissions and counteract the Obama administration's pledges to accelerate the transition away from fossil fuels. Offshore drilling threatens the well-being of Gulf Coast communities and wildlife. Link to letter: http://webiva-downton.s3.amazonaws.com/877/de/e/7666/Cancel_GOM_March_23_auction_Group_letter.pdf

Fighting new offshore leases in the Gulf of Mexico, long an epicenter of the fossil fuel industry, represents a new front for an environmental movement that has recently focused on stopping offshore drilling in the Arctic and Atlantic oceans. The Obama administration just released its 2017-2022 plan for offshore fossil fuel development, which took the Atlantic off the table but proposed three leases for the Arctic and 10 for the Gulf.

The Superdome rally will build off the momentum of the national Keep It in the Ground movement, which has used direct action to block federal auctions of drilling rights on public lands across the country over the past year. Gulf residents are also demanding the industry create at least 1,000 jobs to address its aging infrastructure and toxic legacy, particularly in communities of color.

Details on the Superdome event and Gulf organizing effort can be found at www.nonewleases.org.

Statements from groups and letter signatories:

"The people in the Gulf Coast are finally waking up to the utter destruction of handing over our Gulf of Mexico to Big Oil. Oil spills, a destroyed coast and seafood in peril is what has come from drilling over the last fifty years," said **Anne Rolfes of the Louisiana Bucket Brigade**. "We are making a historic call for no new drilling in our Gulf of Mexico. Like the people of the West Coast and Atlantic Coast, we are standing up for ourselves, our future and the future of this planet."

"It's decision making time. Some well-meaning folks say that the choice is between jobs or the planet. That's just not true. It's between just survive, like we've been doing, or thrive. I want my kids to thrive, and that means creating systems of longevity for them. Fossil fuels just aren't that," said **Cherri Foytlin with Bridge the Gulf and Idle No More**.

"The marine environment, our coastal communities, our seafood and really, the entire planet are under assault by oil and gas operations in the Gulf," said **Jonathan Henderson with New Orleans-based Vanishing Earth**. "Everyday, oil is leaking and toxic fracking chemicals are being dumped offshore, while some 27,000 abandoned wells are ticking time bombs."

"The Gulf of Mexico has been devastated by negligent oil companies and continues to be plundered for profit. President Obama, stop these corporate giveaways and protect the Gulf for the safety, health and economy of Gulf Coast people, its ecosystems, and for our climate," said **Ruth Breech, senior campaigner at Rainforest Action Network**.

"East Coast communities rose up against offshore oil drilling and the Atlantic was protected. The lesson is that public action matters. Now we need to demand no new leases in the Arctic and Gulf of Mexico, to protect our climate, wildlife and coastal communities," said **Miyoko Sakashita, oceans program director at the Center of Biological Diversity**.

"Expanding offshore oil and gas development comes with significant risks that are nearly impossible to avoid or mitigate," said **Marissa Knodel, climate campaigner at Friends of the Earth.** "Our message is simple: The Gulf Coast should not be treated as an energy sacrifice zone, but a place worthy of protection for present and future generations to experience and enjoy."

"From the BP drilling disaster to the loss of coastal wetlands the size of Delaware, the Gulf has already paid too high a price for our nation's oil addiction," said **Aaron Viles with Care2.com**. "We're standing alongside over 65,000 Care2 members who have asked the Administration to admit all carbon is connected, and end new oil leasing in the Gulf of Mexico."

"Tomorrow is today. *Now* is the time to diversify the Gulf's economy, creating and investing in clean and inclusive economic development," said **Jackie Antalan, director of outreach & programs with Operation HomeCare, Inc**.

"In a chilling foretelling, BP nicknamed its own Deepwater Horizon oil drilling lease 'Macondo,' the cursed town of mirrors in Gabriel Garcia Marquez' *100 Years of Solitude*, and the story of

generations doomed to repeat history," said **Janet MacGillivray, Esq. with Indigena.** "We are here on 3/23 to stop the next generation of oil and gas leases, break the curse and unite with communities to claim a fossil free future."

"Turning over even more of our public waters to Big Oil is a step backward," said **Allison Fisher, outreach director of Public Citizen's Climate and Energy Program.** "Less, not more drilling in the Gulf, is required to reduce the risk of catastrophic spills, protect coastal communities and achieve significant cuts in U.S. carbon pollution."

"The people of the Gulf and citizens across the nation are no longer willing to make the Gulf of Mexico a national sacrifice zone for the fossil fuel industry," said **David Helvarg, executive director of Blue Frontier.** "It's time to stop drilling and spilling and move on to job-generating clean energy. Besides, no wind spill ever destroyed a beach or a bayou."

"We cannot continue selling our children and grandchildren's future to the fossil fuel companies. The Gulf, or any biodiverse ecosystem, should not be sacrificed for oil and gas development, said **Shelley Silbert, executive director of Great Old Broads for Wilderness.** Public lands and waters need to be the solution to climate change, not the problem. These are places to celebrate and leave intact to sustain the health of our planet."

"International climate deals are meaningless if they don't result in keeping fossil fuels in the ground. This fossil fuel auction is a test of President Obama's resolve. Will he stand with local communities fighting for a just transition to clean energy, or a fossil fuel industry motivated only by greed? Climate leadership means keeping fossil fuels in the ground, and under the sea," said **Jason Kowalski, policy director at 350.org.**

BB-1 The purpose of the proposed Federal action is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the OCSLA (67 Stat. 462), as amended (43 U.S.C §§ 1331 *et seq.*). The OCSLA provides the Congressional mandate for BOEM to make "available for expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs" the land of the Federal OCS. The decision to cancel a lease sale is under the authority of the Assistant Secretary for Land and Minerals Management.

BB-2 According to the President's *The All-of-the-Above Energy Strategy as a Path to Sustainable Economic Growth* (Executive Office of the President, 2014), oil and natural gas supplies are integral to meeting national energy demand. Oil from the Gulf of Mexico OCS contributes to meeting domestic demand and enhances national economic security. Although peak OCS production may not occur until some point in the future, oil and gas production is still necessary to bridge to a balanced, or even different, energy future. Over the next 20 years, the U.S. Dept. of Energy's Energy Information Administration expects the U.S. to rely on more oil and natural gas to meet its energy demands, even as alternative sources of energy provide an increasing share of U.S. energy needs. Since the U.S. is expected to continue to rely on oil and natural gas to meet its energy needs, the proposed action would contribute to meeting that domestic demand. The OCS is a major long-term supplier of crude oil and natural gas, and the Gulf of Mexico OCS region has the greatest resource potential of the four OCS regions in the United States.

BOEM recognizes the importance of climate change and considers many facets of the potential effects of climate change in its decisionmaking with respect to oil and gas leasing, whether in the Five-Year Program or lease sale analyses. In the Five-Year Program EIS, BOEM compares GHG emissions from direct OCS with those that could occur from energy substitutes that would presumably replace OCS production in the absence of a new OCS Program and comparable demand levels. Downstream greenhouse gases are not quantified. The supporting economic analysis report concludes that the consumption of OCS fuels does not have much of an impact on overall GHG emissions because there is assumed to be limited change in demand (Industrial Economics, Inc. 2012). Refer to the 2012-2017 WPA/CPA Multisale EIS for additional information about GHG emissions and climate change. BOEM expects that reducing OCS oil and gas consumption in the U.S. and associated emissions from limiting OCS leasing would largely be offset by substitutes from other energy sources, either within the United States or elsewhere. BOEM has considered a No Action alternative (i.e., cancellation of the proposed lease sale); however, that does not necessarily equate to zero downstream GHG emissions from oil and gas unless energy demand or supply changes drastically or cost-competitive clean energy sources are substituted.

IEN-1

job.

MS. NORD:

Okay. And please state your name and if you're with an organization.

MS. VERDIN: My name is Monique Verdin, and I am a member of the United Houma Nation, a resident of Saint Bernard Parish, and I am the Gulf Coast liaison for the Indigenous Environmental Network, and I'm here today to support Alternative C, which is no new leases in the Gulf, and we find that, you know, our people here along the coast are feeling the effects of the injustice of oil and gas exploration and extraction and have been for quite some time and believe that these new leases that are on the table will only further endanger our health, our wellbeing, our waters, our land, our livelihoods. So yeah, that's pretty much it. No new leases. Thank you.

MS. NORD:

Thank you. Okay. Our next speaker is Anne Rolfes.

IEN-1 The purpose of the proposed Federal action is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the OCSLA (67 Stat. 462), as amended (43 U.S.C §§ 1331 *et seq.*). The OCSLA provides the Congressional mandate for BOEM to make "available for expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs" the land of the Federal OCS. The decision to cancel a lease sale is under the authority of the Assistant Secretary for Land and Minerals Management.

April 11, 2016

Mr. Gary D. Goeke
Chief, Environmental Assessment Section
Office of Environment (GM 623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Submitted via E-mail to cpa247@boem.gov

Re: Comments on the Draft CPA 247 Supplemental EIS

Dear Mr. Goeke:

The American Petroleum Institute (API) offers the following comments on the U.S. Department of Interior Bureau of Ocean Energy Management's (BOEM's) Draft Supplemental Environmental Impact Statement (DSEIS) for the Central Planning Area (CPA) Gulf of Mexico (GOM) lease sale scheduled for 2017 (also referred to as the '*CPA Lease Sale 247 DSEIS*'). The API is a national trade association that represents over 650 members involved in all aspects of the oil and natural gas industry, including exploring for and developing oil and natural gas resources in the GOM – a vital part of our nation's economy. The industry supports millions of American jobs and delivers billions of dollars in annual revenue to our government.

BOEM's *CPA Lease Sale 247 DSEIS* addresses one proposed Federal action that offers areas for lease on the Gulf of Mexico (GOM) Outer Continental Shelf (OCS) that may contain substantial reserves of economically recoverable oil and gas resources. The Gulf of Mexico constitutes one of the world's major oil and gas producing areas, and has proved a steady and reliable source of U.S. crude oil and natural gas for more than 50 years.

The CPA is a critically important hydrocarbon energy producing area where existing infrastructure and expertise can be used to increase our nation's oil and natural gas resources. Predictable lease sales in this Planning Area are needed to help ensure continued offshore exploration and production in the future since leases sold today will take many years to fully develop. Predictability and certainty in the leasing program helps companies make the long-term decisions required for offshore development and avoids the potential of having years wasted in bringing vital oil and natural gas production to the market.

BOEM's NEPA Analysis

API strongly supports the analysis made by BOEM in the Gulf of Mexico OCS Oil and Gas Lease Sale: 2017 Central Planning Area Lease Sale 247 Draft Supplemental Environmental Impact Statement (OCS EIS/EA BOEM 2016-006). API believes that the detailed analysis provided in the DSEIS, along with the other supporting environmental documents and additional assessments being conducted by BOEM provide a thorough analysis upon which to make decisions related to the proposed lease sale, new or revised exploration and development plans in the CPA, and future permit applications, without delay. API

notes that the DSEIS contains (by reference) updated information and analyses regarding the 2010 Macondo oil spill. This new information supports the NEPA process by describing the current environmental baseline conditions in the CPA (as appropriate) including the results of numerous new scientific studies regarding the spill. We encourage BOEM to continue reviewing and evaluating the sound, peer-reviewed science in this area and to avoid the use of unsubstantiated or anecdotal information.

API also acknowledges that BOEM has conducted a detailed Catastrophic Spill Event Analysis at Appendix B of the DSEIS to consider the environmental impacts associated with a low probability high-volume oil spill resulting from loss of well control on the Gulf of Mexico OCS. API believes that this analysis fully meets the agency's obligations under NEPA to provide decision makers with a robust analysis of reasonably foreseeable impacts associated with a low probability oil spill on the OCS.

Tiering Under the National Environmental Policy Act (NEPA)

API supports BOEM's approach of evaluating multiple similar federal actions (i.e. holding multiple lease sales) in a single EIS as provided in the Council on Environmental Quality's (CEQ's) regulations (see 40 CFR 1502.4). API believes that this approach will allow the NEPA reviews of the subsequent lease sales to proceed efficiently by focusing on any new issues or information and avoiding the repetitive issuance of cumbersome draft and final EISs for each sale area. In short, API fully supports BOEM's continued practice of tiering EISs and Environmental Assessments (EISs/EAs) under NEPA.

Alternatives Considered in the SEIS

The W*PA Lease Sales 248 DSEIS* considers three alternatives for the proposed lease sales. API strongly supports Alternative A (the *Proposed Action*) for the proposed CPA lease sales as described below:

Alternative A—The Proposed Action (Preferred Alternative): This alternative would offer for lease all unleased blocks within the proposed CPA lease sale area for oil and gas operations, with the following exceptions:

(1) whole and partial blocks deferred by the Gulf of Mexico Energy Security Act of 2006; and
(2) blocks that are adjacent to or beyond the United States' Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap.

API-1 API is strongly opposed to *Alternatives B and C* for the CPA lease sale. The analysis in the DEIS does not support the adoption of such restrictive alternatives. Adoption of *Alternative A* is fully consistent with the agency's analysis.

Discussion of "Incomplete and Unavailable" Information

API-2 On several occasions throughout the document, the DEIS discusses the instances in which the information available to BOEM is "incomplete or unavailable" within the meaning of 40 C.F.R. § 1502.22. Although "numerous" instances are cited, BOEM has determined, after careful analysis, that the currently unavailable information is not essential to a reasoned choice among alternatives. This conclusion is an important one, since both CEQ regulations and case law spell out how an agency must proceed when confronted by information that is not currently available.

The resources of the GOM remain a vital source of jobs, revenue, energy and economic growth for the nation. API and its member companies are committed to the safe and responsible development of these vital oil and natural gas resources. As such, we ask that the department finalize the *CPA Lease Sales 247 DSEIS* as quickly as possible so that leasing can continue in accordance with *Alternative A* as proposed in the DSEIS.

Should you have any questions on these comments please contact me at (202) 682-8584 or by email at radforda@api.org.

Sincerely,

Andy Radford

API-1 Comment noted.

API-2 Comment noted.

CENTER *for* BIOLOGICAL DIVERSITY

Via Regulations.gov and First Class Mail

April 11, 2016

Gary D. Goeke, Chief
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region, Office of Environment (GM 623E)
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123–2394
cpa247@boem.gov

RE: Draft Supplemental Environmental Impact Statement on Lease Sale 247 in the Central Planning Area of the Gulf of Mexico, 81 Fed. Reg. 9881 (Feb. 26, 2016) Docket No. BOEM–2015–0141

Dear Mr. Goeke,

The Center for Biological Diversity ("Center") submits the following comments to the Bureau of Ocean Energy Management ("BOEM") on the Draft Supplemental Environmental Impact Statement for the Proposed Gulf of Mexico Outer Continental Shelf Oil and Gas Central Planning Area Lease Sale 247 ("Draft SEIS"), 81 Fed. Reg. 9881 (Feb. 26, 2016). BOEM's Draft SEIS proposes to offer more than 45 million acres of the Central Planning Area of the Gulf of Mexico for oil and gas leasing. BOEM estimates that the Lease Sale would result in the production of up to nearly 900 million barrels of oil and 4 trillion cubic feet of gas.

CBD-1

BOEM's proposal will cause a wide variety of harm to public health and the environment including greenhouse gas emissions that will exacerbate climate change; oil spills that would be nearly impossible to clean up; air and water pollution; and further negative impacts to already imperiled wildlife and local communities, many of which are still suffering the effects of the devastating *Deepwater Horizon* oil spill. The Center therefore urges BOEM to adopt the no action alternative, cancel Lease Sale 247 and keep these dirty fossil fuels in the ground.

BOEM's mandate to ensure that offshore oil and gas development is balanced "with protection of the human, marine, and coastal environments,"[1] requires BOEM to limit the climate change effects of its actions, particularly considering that BOEM has already leased more than 23 million acres of the Gulf of Mexico to oil companies. Canceling Lease Sale 247 would lock away millions of tons of greenhouse gas pollution and limit destructive effects associated with drilling for and burning oil and gas extracted from our oceans.

[1] 43 U.S.C. § 1802(2).

Alaska · Arizona · California · Florida · Minnesota · Nevada · New Mexico · New York · Oregon · Vermont · Washington, DC
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At the very least, BOEM must substantially revise its Draft SEIS and reissue the document for public comment. The Draft SEIS relies on an improper use of tiering; fails to adequately define the purpose and need; fails to take a "hard look" at the impacts of the Lease Sale by failing to consider the impacts from greenhouse gas emissions, offshore fracking and acidizing that could result from the Lease Sale; fails to adequately consider the cumulative impacts of the Lease Sale; fails to consider an adequate range of alternatives; and fails to adequately consider environmental justice issues. In short, the Draft SEIS is woefully inadequate and does not meet the legal requirements of the National Environmental Policy Act ("NEPA").

I. BOEM's Draft SEIS Is an Improper Use of Tiering

CBD-2

NEPA regulations recognize that "tiering" from one environmental analysis to another may sometimes be appropriate where a broad environmental analysis has been conducted and the agency wishes to refer back to that assessment at a subsequent stage to avoid repetition.[2] However, the process cannot be used to evade the thorough review required by NEPA. Indeed, "it is not better documents but better decisions that count. NEPA's purpose is not to generate paperwork — even excellent paperwork — but to foster excellent action."[3] But BOEM is using tiering in the Draft SEIS to avoid the requisite in-depth analysis required by NEPA.

Following the *Deepwater Horizon* catastrophe, President Obama convened the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling — an independent, nonpartisan entity charged with, *inter alia*, providing a thorough analysis of the causes of the disaster and recommending reforms for making offshore drilling safer. The Commission's final report attributed the "systemic" breakdown of the environmental review process for oil and gas activities on the outer continental shelf ("OCS") as one of the causes of the spill and called for "significant revision" to the agency's "approach to the application of NEPA requirements in the offshore oil and gas context."[4] One particular area in which the Commission called for revision was the agency's use of "tiering" because rather "than encouraging more thorough reviews at each subsequent stage of the offshore leasing process" the agency's application of tiering "created a system where deeper environmental analysis at more geographically targeted and advanced planning stages did not always take place."[5]

BOEM's Draft SEIS clearly shows that it has not adequately amended its use of tiering. Rather than leading toward more precise environmental analyses regarding the particular impacts of Lease Sale 247 based on new information, BOEM's Draft SEIS largely simply refers back to the prior analyses. For example, despite estimating how many new wells would be drilled as the result of Lease Sale 247, BOEM wholly fails to quantify the air emissions that would result from the drilling of such wells (including emissions from platform operations, fugitive emissions, and support vessels). Instead, BOEM includes a summary of emissions from *all* OCS operations in the Gulf and refers back to its earlier NEPA analyses that did not quantify emissions from Lease

[2] See 40 C.F.R. § 1508.28
[3] 40 C.F.R. § 1500.1(c).
[4] National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling* (Jan. 2011) at 260, http://www.gpo.gov/fdsys/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf.
[5] *Id.*

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Sale 247 either. This is a clear abuse of the tiering process that fails to lead to the legally required hard look of the impacts of Lease Sale 247.

II. BOEM Failed To Properly Define the Purpose and Need of the Proposed Action

CBD-3

In its Draft SEIS, BOEM proposes to lease the unleased areas of the Central Planning Area in the Gulf of Mexico for oil and gas development.[6] BOEM's purpose and need for the proposed action is "to offer for lease those areas that may contain economically recoverable oil and gas resources. . . to further the orderly development of OCS resources."[7] This purpose and need statement fails to comply with NEPA.

NEPA's implementing regulations provide that an environmental document should specify the underlying purpose and need to which the agency is responding in proposing the alternative including the proposed action.[8] This purpose and need inquiry is crucial for a sufficient environmental analysis because "[t]he stated goal of a project necessarily dictates the range of 'reasonable' alternatives."[9] Thus, "an agency cannot define its objectives in unreasonably narrow terms" without violating NEPA.[10]

BOEM's purpose and need is entirely inadequate because BOEM necessarily considered an unreasonably narrow range of alternatives. The Outer Continental Shelf Lands Act charges BOEM with ensuring that "environmental safeguards" are in place for offshore oil development and ensuring the "balance [of] orderly energy resource development *with protection of the human, marine, and coastal environments*."[11] Accordingly, BOEM should have focused its purpose and need inquiry on objectives that comport with these statutory duties,[12] particularly in light of the amount of OCS areas that are already under lease and producing oil and gas. In other words, such a narrow definition of purpose and need leaves the preferred alternative — holding the Lease Sale — as the only method for achieving the stated purpose.

Moreover, NEPA evaluation must take place "*before* decisions are made and *before* actions are taken."[13] Such an approach ensures that agencies will take the requisite "hard look" at environmental consequences *before* approving any major federal action.[14] But BOEM's purpose and need statement indicates that it did just the opposite. In other words, the purpose and need statement demonstrates that BOEM already made the decision to hold Lease Sale 247 and that its entire analysis was framed in a way to support that pre-determined outcome. BOEM's backward approach reflects a fundamental misunderstanding of its legal obligations and an apparent desire to appease the oil industry at the expense of the Gulf environment and our climate.

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[6] Draft SEIS at 1-3.
[7] *Id.*
[8] 40 C.F.R. § 1502.13.
[9] *Carmel-by-the-Sea v. U.S. Dep't of Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1997).
[10] *Id.*
[11] 43 U.S.C. §§ 1332(3), 1802(2)(B) (emphasis added).
[12] *See Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991) (observing that "agencies must look hard at the factors relevant to the definition of purpose," including the views of Congress in authorizing the agency to act, and define goals accordingly).
[13] 40 C.F.R. § 1500.1(a) (emphasis added).
[14] *Kleppe v. Sierra Club*, 427 U.S. 390, 410, n. 21 (1976); *see also* 40 C.F.R. § 1502.5 (analysis must "not be used to rationalize or justify decisions already made").

III. BOEM Failed To Adequately Consider the Impacts of Greenhouse Gas Emissions and Climate Change

CBD-4

BOEM's Draft SEIS fails to consider that expansion of fossil fuel production in the Gulf of Mexico will substantially increase the volume of greenhouse gases emitted into the atmosphere and jeopardize the environment and the health and well-being of future generations. In evaluating the environmental impacts of the proposed action, NEPA requires BOEM to consider and describe the direct and indirect impacts.[15] These impacts are distinct from one another. Direct effects are "caused by the action and occur at the same time and place."[16] Indirect effects are caused by the action but, "are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effect on air and water and other natural systems, including ecosystems."[17]

BOEM's Draft EIS states that the estimated amount of oil to be developed as a result of Lease Sale 247 is 0.460 to 0.894 billion barrels of oil and 1.939 to 3.903 trillion cubic feet of gas. Development of this oil and gas will emit greenhouse gases, as will the transportation, processing and consumption of the extracted oil and gas. Indeed, consumption of the extracted oil and gas alone will result in the emissions of up to approximately 384 million metric tons of carbon dioxide from consuming the oil and 207 million metric tons of carbon dioxide from consuming the gas, for a total of more than 590 million metric tons.[18]

Yet despite being reasonably foreseeable impacts of the lease sale, BOEM wholly fails to quantify the greenhouse gas emissions that could result from oil and gas exploration, development or production under Lease Sale 247; the emissions from transporting, refining and burning the oil extracted under Lease Sale 247; or consider the impacts of these greenhouse gas emissions on an already changing climate. BOEM's Draft SEIS fails to take the requisite hard look as a result.

1. <u>BOEM Failed To Consider the Impacts from Greenhouse Gas Emissions</u>

The greenhouse gas emissions that could result from Lease Sale 247 will have far-reaching impacts on natural and social systems. But the Draft SEIS fails to quantify these greenhouse gas emissions or provide any meaningful analysis of the Lease Sale's contribution to these effects. BOEM's Draft SEIS therefore fails to comply with NEPA.

Numerous authoritative scientific assessments have established that climate change is causing grave harms to human society and natural systems, and these threats are becoming increasingly dangerous. The Intergovernmental Panel on Climate Change ("IPCC"), in its 2014 Fifth Assessment Report, stated that: "[w]arming of the climate system is unequivocal, and since

[15] 40 C.F.R §§ 1502.16, 1508.7, 1508.8; *Northern Plains Resource Council v. Surface Transportation Board*, 668 F.3d 1067, 1072-73 (9th Cir. 2011).
[16] 40 C.F.R. § 1508.8(a).
[17] *Id.* § 1508.8(b).
[18] Carbon emissions calculated pursuant to EPA's GHG Equivalencies Calculator at http://www2.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references (updated Oct. 8, 2015).

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the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" and that "[r]ecent climate changes have had widespread impacts on human and natural systems."[19]

The United States' 2014 Third National Climate Assessment, prepared by a panel of non-governmental experts and reviewed by the National Academy of Sciences and multiple federal agencies similarly stated "[t]hat the planet has warmed is 'unequivocal,' and is corroborated though multiple lines of evidence, as is the conclusion that the causes are very likely human in origin"[20] and "[i]impacts related to climate change are already evident in many regions and are expected to become increasingly disruptive across the nation throughout this century and beyond."[21] The United States National Research Council similarly concluded that: "[c]limate change is occurring, is caused largely by human activities, and poses significant risks for—and in many cases is already affecting—a broad range of human and natural systems."[22]

The IPCC and National Climate Assessment further decisively recognize the dominant role of fossil fuels in driving climate change:

> While scientists continue to refine projections of the future, observations unequivocally show that climate is changing and that the warming of the past 50 years is primarily due to human-induced emissions of heat-trapping gases. These emissions come mainly from burning coal, oil, and gas, with additional contributions from forest clearing and some agricultural practices.[23]
> ***
>
> CO_2 emissions from fossil fuel combustion and industrial processes contributed about 78% to the total GHG emission increase between 1970 and 2010, with a contribution of similar percentage over the 2000–2010 period (*high confidence*).[24]

These impacts of fossil fuels are harming the United States in myriad ways, with the impacts certain to worsen over the coming decades absent deep reductions in domestic and global greenhouse gas emissions. The U.S. Environmental Protection Agency ("EPA") recognized these threats in 2009, concluding that greenhouse gases "may reasonably be anticipated both to endanger public health and to endanger public welfare."[25] In finding that climate change endangers public health and welfare, EPA has acknowledged the overwhelming evidence of the observed and projected effects of climate change upon the nation. These include:

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[19] IPCC AR5 Synthesis Report at 2.
[20] Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: Climate Change Impacts in the United States: The Third National Climate Assessment (U.S. Global Change Research Program). DOI:10.7930/J0Z31WJ2 (Third National Climate Assessment) at 61 (quoting IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and H. L. Miller, Eds., Cambridge University Press, 1-18.).
[21] Third National Climate Assessment at 10.
[22] National Research Council, Advancing the Science of Climate Change (2010) at 2, available at www.nap.edu.
[23] Third National Climate Assessment at 2.
[24] IPCC AR5 Synthesis Report at 46.
[25] Final Endangerment Finding, 74 Fed. Reg. at 66,497.

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Effects on air quality: "The evidence concerning adverse air quality impacts provides strong and clear support for an endangerment finding. Increases in ambient ozone are expected to occur over broad areas of the country, and they are expected to increase serious adverse health effects in large population areas that are and may continue to be in nonattainment. The evaluation of the potential risks associated with increases in ozone in attainment areas also supports such a finding."[26]

Effects on health from increased temperatures: "The impact on mortality and morbidity associated with increases in average temperatures, which increase the likelihood of heat waves, also provides support for a public health endangerment finding."[27]

Increased chance of extreme weather events "The evidence concerning how human induced climate change may alter extreme weather events also clearly supports a finding of endangerment, given the serious adverse impacts that can result from such events and the increase in risk, even if small, of the occurrence and intensity of events such as hurricanes and floods. Additionally, public health is expected to be adversely affected by an increase in the severity of coastal storm events due to rising sea levels."[28]

Impacts to water resources: "Water resources across large areas of the country are at serious risk from climate change, with effects on water supplies, water quality, and adverse effects from extreme events such as floods and droughts. Even areas of the country where an increase in water flow is projected could face water resource problems from the supply and water quality problems associated with temperature increases and precipitation variability, as well as the increased risk of serious adverse effects from extreme events, such as floods and drought. The severity of risks and impacts is likely to increase over time with accumulating greenhouse gas concentrations and associated temperature increases."[29]

Impacts from sea level rise: "The most serious potential adverse effects are the increased risk of storm surge and flooding in coastal areas from sea level rise and more intense storms. Observed sea level rise is already increasing the risk of storm surge and flooding in some coastal areas. The conclusion in the assessment literature that there is the potential for hurricanes to become more intense (and even some evidence that Atlantic hurricanes have already become more intense) reinforces the judgment that coastal communities are now endangered by human-induced climate change, and may face substantially greater risk in the future. Even if there is a low probability of raising the destructive power of hurricanes, this threat is enough to support a finding that coastal communities are endangered by greenhouse gas air pollution. In addition, coastal areas face other adverse impacts from sea level rise such as land loss due to inundation, erosion, wetland submergence, and habitat loss. The increased risk associated with these adverse impacts also endangers public welfare, with an increasing risk of greater adverse impacts in the future."[30]

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[26] *Id.*
[27] *Id.*
[28] *Id.* at 66,497-98.
[29] Final Endangerment Finding at 66,498.
[30] *Id.*

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Impacts to energy, infrastructure, and settlements: "Changes in extreme weather events threaten energy, transportation, and water resource infrastructure. Vulnerabilities of industry, infrastructure, and settlements to climate change are generally greater in high-risk locations, particularly coastal and riverine areas, and areas whose economies are closely linked with climate-sensitive resources. Climate change will likely interact with and possibly exacerbate ongoing environmental change and environmental pressures in settlements, particularly in Alaska where indigenous communities are facing major environmental and cultural impacts on their historic lifestyles."[31]

Impacts to wildlife: "Over the 21st century, changes in climate will cause some species to shift north and to higher elevations and fundamentally rearrange U.S. ecosystems. Differential capacities for range shifts and constraints from development, habitat fragmentation, invasive species, and broken ecological connections will likely alter ecosystem structure, function, and services, leading to predominantly negative consequences for biodiversity and the provision of ecosystem goods and services."[32]

In addition to these EPA-acknowledged impacts on public health and welfare generally, climate change is causing and will continue to cause serious impacts on natural resources that the Department of the Interior is specifically charged with safeguarding.

Impacts to public lands: Climate change is causing and will continue to cause specific impacts to public lands and resources. Although public lands provide a variety of public benefits, one recent Forest Service attempt at quantification estimates the public land ecosystem services at risk from climate change at between $14.5 and $36.1 billion annually.[33] In addition to the general loss of public land resources, irreplaceable species and aesthetic and recreational treasures are at risk of permanent destruction. High temperatures are causing loss of glaciers in Glacier National Park; the Park's glaciers are expected to disappear entirely by 2030, with ensuing warming of stream temperatures and adverse effects to aquatic ecosystems.[34] With effects of warming more pronounced at higher latitudes, tundra ecosystems on Alaska public lands face serious declines, with potentially serious additional climate feedbacks from melting permafrost.[35] In Florida, the Everglades face severe ecosystem disruption from already-occurring saltwater incursion.[36] Sea level rise will further damage freshwater ecosystems and the endangered species that rely on them.

Impacts to biodiversity and ecosystems: Across the United States, ecosystems and biodiversity are directly under siege from climate change — leading to the loss of iconic species and landscapes, negative effects on food chains, disrupted migrations, and the degradation of

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[31] *Id.*

[32] *Id.* at 66,498; *see also* Third National Climate Assessment at 195-219.

[33] Esposito, Valerie *et al.*, Climate Change and Ecosystem Services: The Contribution and Impacts on Federal Public Lands in the United States, USDA Forest Service Proceedings RMRS-P-64 at 155-164 (2011).

[34] U.S. Environmental Protection Agency, Climate Change and Public Lands (1999).

[35] *See* National Climate Assessment at 48; MacDougall, A. H., *et al.*, Significant contribution to climate warming from the permafrost carbon feedback, 5 Nature Geoscience 719-721 (2012), doi:10.1038/ngeo1573.

[36] *See* National Climate Assessment at 592; Foti, R., M, *et al.*, Signs of critical transition in the Everglades wetlands in response to climate and anthropogenic changes, 110 Proceedings of the National Academy of Sciences, 6296-6300, (2013), doi:10.1073/pnas.1302558110.

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whole ecosystems.[37] Specifically, scientific evidence shows that climate change is already causing changes in distribution, phenology, physiology, genetics, species interactions, ecosystem services, demographic rates, and population viability: many animals and plants are moving poleward and upward in elevation, shifting their timing of breeding and migration, and experiencing population declines and extirpations.[38] Because climate change is occurring at an unprecedented pace with multiple synergistic impacts, climate change is predicted to result in catastrophic species losses during this century. For example, the IPCC concluded that 20% to 30% of plant and animal species will face an increased risk of extinction if global average temperature rise exceeds 1.5°C to 2.5°C relative to 1980-1999, with an increased risk of extinction for up to 70% of species worldwide if global average temperature exceeds 3.5°C relative to 1980-1999.[39]

Impacts to oceans: Oceans have absorbed the vast bulk of warming to date, and will continue to suffer increasingly severe impacts on temperature, acidity, circulation, and marine ecosystems from climate change.[40] A recent survey of science regarding climate change impacts to the world's oceans finds that:

> Marine ecosystems are centrally important to the biology of the planet, yet a comprehensive understanding of how anthropogenic climate change is affecting them has been poorly developed. Recent studies indicate that rapidly rising greenhouse gas concentrations are driving ocean systems toward conditions not seen for millions of years, with an associated risk of fundamental and irreversible ecological transformation. The impacts of anthropogenic climate change so far include decreased ocean productivity, altered food web dynamics, reduced abundance of habitat-forming species, shifting species distributions, and a greater incidence of disease. Although there is considerable uncertainty about the spatial and temporal details, climate change is clearly and fundamentally altering ocean ecosystems. Further change will continue to create enormous challenges and costs for societies worldwide, particularly those in developing countries.[41]

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[37] National Climate Assessment at 13.

[38] *See* Parmesan, C. and G. Yohe, A globally coherent fingerprint of climate change impacts across natural systems, 421 Nature 37–42 (2003); Root, T. *et al.*, Fingerprints of global warming on wild animals and plants, 421 Nature 57–60 (2003); Chen, I. *et al.*, Rapid range shifts of species associated with high levels of climate warming, 333 Science 1024–1026 (2011).

[39] IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change 48 [Core Writing Team, Pachauri, R.K and Reisinger, A.(eds.)]. Other studies have predicted similarly severe losses: 15%-37% of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario, *see* Thomas *et al.*, Extinction risk from climate change, 427 Nature 145–8 (2004)); the potential extinction of 10% to 14% of species by 2100 if climate change continues unabated, *see* Maclean, I. M. D. and R. J. Wilson, Recent ecological responses to climate change support predictions of high extinction risk, 108 Proceedings of the National Academy of Sciences of the United States of America 12337-12342 (2011); and the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species, *see* Warren, R. J. *et al.*, Increasing Impacts of Climate Change Upon Ecosystems with Increasing Global Mean Temperature Rise, 106 Climatic Change 141–77 (2011).

[40] *See* National Climate Assessment at 558-59.

[41] Ove Hoegh-Guldberg et al., The Impact of Climate Change on the World's Marine Ecosystems, Science 328, 1523 (2010), DOI: 10.1126/science.1189930

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The IPCC's Fifth Assessment Report on Climate Change Impacts, Adaptation, and Vulnerability similarly summarizes the state of scientific research on foreseeable impacts to marine systems and reaches the following conclusions:

> **Due to projected climate change by the mid-21st century and beyond, global marine-species redistribution and marine-biodiversity reduction in sensitive regions will challenge the sustained provision of fisheries productivity and other ecosystem services (*high confidence*).** Spatial shifts of marine species due to projected warming will cause high-latitude invasions and high local-extinction rates in the tropics and semi-enclosed seas (*medium confidence*). Species richness and fisheries catch potential are projected to increase, on average, at mid and high latitudes (*high confidence*) and decrease at tropical latitudes (*medium confidence*). . . . The progressive expansion of oxygen minimum zones and anoxic "dead zones" is projected to further constrain fish habitat. Open-ocean net primary production is projected to redistribute and, by 2100, fall globally under all RCP scenarios. Climate change adds to the threats of over-fishing and other non-climatic stressors, thus complicating marine management regimes (*high confidence*).
>
> **For medium- to high-emission scenarios (RCP 4.5, 6.0, and 8.5), ocean acidification poses substantial risks to marine ecosystems, especially polar ecosystems and coral reefs, associated with impacts on the physiology, behavior, and population dynamics of individual species from phytoplankton to animals (*medium to high confidence*).** Highly calcified mollusks, echinoderms, and reef-building corals are more sensitive than crustaceans (*high confidence*) and fishes (*low confidence*), with potentially detrimental consequences for fisheries and livelihoods. . . . Ocean acidification acts together with other global changes (e.g. warming, decreasing oxygen levels) and with local changes (e.g. pollution, eutrophication) (*high confidence*). Simultaneous drivers, such as warming and ocean acidification, can lead to interactive, complex, and amplified impacts for species and ecosystems.[42]

In addition, ocean acidification has the potential to profoundly affect the growth and toxicity of phytoplankton associated with harmful algae blooms ("HABs").[43] HABs can cause mortality in marine mammals through contamination of food sources. Some strains of

[42] IPCC, 2014: Summary for Policymakers 17, in: *Climate Change 2014: Impacts, Adaptation, and Vulnerability, Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.

[43] Tatters, A. O., F.-X. Fu, and D. A. Hutchins. 2012. High CO2 and Silicate Limitation Synergistically Increase the Toxicity of Pseudo-nitzschia fraudulenta. PLoS ONE 7:e32116; Fu, F., A. Tatters, and D. Hutchins. 2012. Global change and the future of harmful algal blooms in the ocean. Marine Ecology Progress Series 470:207–233; Flynn, K. J., D. R. Clark, A. Mitra, H. Fabian, P. J. Hansen, P. M. Glibert, G. L. Wheeler, D. K. Stoecker, J. C. Blackford, and C. Brownlee. 2015. Ocean acidification with (de)eutrophication will alter future phytoplankton growth and succession. Proceedings of the Royal Society of London B: Biological Sciences 282:20142604.

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phytoplankton in HABs produce copious amount of domoic acid, a kanic acid analog neurotoxin.[44] Exposure to this toxin via food sources can affect the brain, causing seizures, provoke organ failure, and ultimately death in several marine mammal species, from small sea otters, seals, sea lions, to large whales.[45] In the past three decades, HABs seem to have become more frequent, more intense, and more widespread.[46] Indeed, the Gulf of Mexico has suffered from massive HABs that have closed beaches from Florida to Texas.[47]

In short, climate change, driven primarily by the combustion of fossil fuels, poses a severe and immediate threat to the health, welfare, ecosystems and economy of the United States and the world. In recognition of these threats, the Paris Agreement — adopted by 197 countries, including the United States, on December 12, 2015 — codifies the international, scientific consensus that climate change is an "*urgent and potentially irreversible threat to human societies and the planet* and thus requires the widest possible cooperation by all countries."[48] Accordingly, it commits all signatories to achieving a set of global goals. Importantly, the Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels."[49] Immediate and aggressive greenhouse gas emissions reductions are necessary to keep warming below a 1.5° or 2°C rise above pre-industrial levels.

Nevertheless, BOEM wholly fails to discuss the Paris Agreement, how its proposed action will affect our ability to comply with the Agreement or limit warming to 1.5° or 2°C, or even attempt to quantify the greenhouse gas emissions that will result from Lease Sale 247. But greenhouse gas emissions are a reasonably foreseeable impact of every phase of activities conducted under an offshore oil and gas lease. For example, greenhouse pollutants will be emitted during construction of offshore platforms; by support vessels; during routine development and production activities operations, including drilling; and during gas flaring and venting associated with production. Greenhouse gases will also be emitted during transportation of the crude oil and gas; during refining and processing; during transportation of the refined product; and by burning the end-product.

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[44] Anderson, D. M., et al. 2014. Understanding interannual, decadal level variability in paralytic shellfish poisoning toxicity in the Gulf of Maine: The HAB Index. Deep Sea Research Part II: Topical Studies in Oceanography 103:264–276.

[45] McHuron, E. A., D. J. Greig, K. M. Colegrove, M. Fleetwood, T. R. Spraker, F. M. D. Gulland, J. T. Harvey, K. A. Lefebvre, and E. R. Frame. 2013. Domoic acid exposure and associated clinical signs and histopathology in Pacific harbor seals (Phoca vitulina richardii). Harmful Algae 23:28–33; Kirkley, K. S., J. E. Madl, C. Duncan, F. M. Gulland, and R. B. Tjalkens. 2014. Domoic acid-induced seizures in California sea lions (Zalophus californianus) are associated with neuroinflammatory brain injury. Aquatic Toxicology 156:259–268; Jensen, S.-K., J.-P. Lacaze, G. Hermann, J. Kershaw, A. Brownlow, A. Turner, and A. Hall. 2015. Detection and effects of harmful algal toxins in Scottish harbour seals and potential links to population decline. Toxicon 97:1–14.

[46] Lewitus, A. J., et al. 2012. Harmful algal blooms along the North American west coast region: History, trends, causes, and impacts. Harmful Algae 19:133–159; Hallegraeff, G. M., editor. 2014. Impacts of climate change on harmful algal blooms and seafood safety. Assessment and management of seafood safety and quality: current practices and emerging issues. Rome.

See e.g., Elizabeth Newbern, Live Science, Red Tide Turns Gulf of Mexico Rust-Colored, Dec. 22, 2015, http://www.livescience.com/53180-red-tide-gulf-of-mexico.html.

[48] Paris Agreement, Decision, Art. 4(3); Recitals.

[49] *Id.*, Art. 2 (emphasis added).

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As such, NEPA requires BOEM to conduct an analysis of the reasonably foreseeable greenhouse gas emissions from Lease Sale 247 and the consequences of these emissions. BOEM cannot dismiss its legal obligation to do so because there is some uncertainty in modeling emissions or assumptions about substitution based on illogical notions of economics or the status quo that completely ignores the Paris Agreement. To do so would be to violate the clear mandates of NEPA. Accordingly, BOEM must quantify the greenhouse gas emissions that could result from the Lease Sale and analyze the "ecological,…economic, [and] social" impacts of such emissions.[50]

In addition, while the modeling studies BOEM relied on in discussing general air quality impacts mentions methane emissions, BOEM failed to consider new research that shows methane leakage from some wells may be as high at 17.3%.[51] BOEM also failed to consider new research showing that fracked wells are up to 2.7 times more likely than a conventional well to have a cement or casing impairment, which can lead to methane leaks.[52] This is a significant concern as methane is a greenhouse gas pollutant with a warming potential that is 87 times that of carbon dioxide over a 20-year period.[53]

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2. <u>The Draft SEIS Ignores the Social Cost of Carbon Tool To Analyze the Cumulative Contribution of Increased Oil and Gas Development on Climate Change</u>

Although a cost-benefit analysis is not necessarily the ideal or exclusive method for assessing contributions to an adverse effect as enormous and potentially catastrophic as climate change, BOEM does have tools available to provide one approximation of external costs — the social cost of carbon. The social cost of carbon was developed by the Interagency Working Group on Social Cost of Carbon, which was convened by the Council of Economic Advisers and the Office of Management and Budget. As explained in the Working Group's report:

> The purpose of the "social cost of carbon" (SCC) estimates presented here is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO2) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions. The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages

[50] *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008); 40 C.F.R. § 1508.8(b).

[51] Caulton, Dana R. et al., Toward a Better Understanding and Quantification of Methane Emissions from Shale Gas Development, 111 Proc. Natl. Acad. Sciences 17 (2014); Schneising, Oliver, et al. 2014. Remote Sensing of Fugitive Methane Emissions from Oil and Gas Production in North American Tight Geologic Formations, Earth's Future 2, doi:10.1002/2014EF000265; Allen, D. T. et al. 2013. Measurements of Methane Emissions at Natural Gas Production Sites in the United States, 110 Proc. Natl. Acad. Sci. 44.

[52] Ingraffea, Anthony R, et al. 2014. Assessment and Risk Analysis of Casing and Cement Impairment in Oil and Gas Wells in Pennsylvania, 2000 – 2012, 111 Proc. Natl. Acad. Sciences 30.

[53] Intergovernmental Panel on Climate Change, Chapter 8: Anthropogenic and Natural Radiative Forcing in Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Table 8.7 (2013).

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from increased flood risk, and the value of ecosystem services due to climate change.[54]

The SCC demonstrates that the benefits of reducing carbon pollution are significant. For example, the recently proposed rules for reducing power plant carbon emissions calculates the climate benefits and health co-benefits to be $15.6 to $88 billion in 2020 and $32.3 to $151 billion in 2030.[55] However, recent studies have demonstrated that the numeric value assigned to the social cost of carbon vastly underestimates the true cost.[56] The social cost of carbon is therefore a minimum value.

Other analytical tools exist to evaluate the cost of methane emissions.[57] EPA has peer-reviewed and employed such a tool in its "Regulatory Impact Analysis of the Proposed Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector."[58]

In short, leasing and development of oil and gas wells could exact extraordinary financial costs to communities and future generations, setting aside the immeasurable loss of irreplaceable, natural values that can never be recovered. BOEM's environmental review must provide an accounting of these potential harms and costs, including the SCC.

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IV. BOEM Failed To Adequately Consider the Impacts from Offshore Fracking and Acidizing

BOEM's Draft SEIS acknowledges that offshore fracking and acidizing are used at platforms in the Gulf of Mexico.[59] But BOEM fails to adequately consider certain impacts from these inherently dangerous practices and wholly ignores other impacts that could occur under Lease Sale 247.

Water contamination is a significant risk of fracking because of the hundreds of chemicals used in fracking fluid. For example, a peer-reviewed study that examined fracking fluid products determined that more than 75% of the chemicals could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems; approximately 40 to 50% could affect the brain/nervous system, immune system, cardiovascular system, and the kidneys;

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[54] Interagency Working Group on Social Cost of Carbon, United States Government, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866, May 2013, available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/social_cost_of_carbon_for_ria_2013_update.pdf.

[55] EPA, Regulatory Impact Analysis Technical Document EPA-452/R-14-002 (June 2014).

[56] F. Ackerman & E. Stanton, Climate Risks and Carbon Prices: Revising the Social Cost of Carbon, in Economics, vol. 6 (Apr. 4, 2012) (the social cost of carbon could be almost $900/tCO2 in 2010, rising to $1,500/tCO2 in 2050).

[57] Marten A.L., Kopits K.A., Griffiths C.W., Newbold S.C., Wolverton A. 2014, online publication (2015, print publication). "Incremental CH4 and N2O mitigation benefits consistent with the US Government's SC-CO2 estimates." Climate Policy 15(2):272-298.

[58] USEPA, Social Cost of Carbon, available at http://www3.epa.gov/climatechange/EPAactivities/economics/scc.html (noting application of social cost of methane supported by peer review); USEPA, Regulatory Impact Analysis of the Proposed Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector, Ch. 4, available at http://www3.epa.gov/airquality/oilandgas/pdfs/og_prop_ria_081815.pdf.

[59] *See e.g.*, Draft SEIS at 3-9.

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37% could affect the endocrine system; and 25% could cause cancer and mutations.[60] In addition to posing a significant health and safety risk to humans, fracking chemicals can kill or harm a wide variety of marine life. Scientific research has indicated that 40 percent of the chemicals used in fracking can harm aquatic animals and other wildlife.[61]

Another recent study found that oil companies use dozens of extremely hazardous chemicals to acidize wells. Specifically, the study found that almost 200 different chemicals have been used and that at least 28 of these substances are F-graded hazardous chemicals — carcinogens, mutagens, reproductive toxins, developmental toxins, endocrine disruptors or high acute toxicity chemicals.[62] Hydrofluoric acid, for example, is acutely toxic, and exposure to fumes or very short-term contact with its liquid form can cause severe burns. The study notes that acidizing chemicals can make up as much as 18 percent of the fluid used in these procedures.[63] Further, each acidization can use as much as hundreds of thousands of pounds of some chemicals.[64]

This raises serious concerns as many of the platforms in the Gulf of Mexico discharge all or a portion of their produced water, including chemicals used in fracking and acidizing, into the ocean. BOEM, however, dismisses the import from such activities on water quality and marine life because the discharge is regulated by Clean Water Act permits issued by EPA. But BOEM ignores the fact that the permit contains no real limit on the quantity of fracking or acidizing chemicals that can be discharged. Moreover, NEPA clearly obligates BOEM to look at *all* environmental impacts, and an agency cannot excuse itself from its NEPA hard look duty because a "facility operates pursuant to a. . . permit. . ." or because the impacts have been discussed in a non-NEPA document.[65]

When not dumped directly into the ocean, wastewater from well stimulation is injected into the seafloor or transported onshore and injected there. This disposal method can result in leaks and contamination through the loss of well casing integrity. Studies have shown that 30% of offshore oil wells in the Gulf of Mexico experienced well casing damage in the first five years after drilling, and damage increased over time to 50% after 20 years.[66] Well stimulation can

[60] Colborn, Theo, et al. 2011. Natural Gas Operations for a Public Health Perspective. 17 Human and Ecological Risk Assessment 1039; Elliot, E.G. et al. 2016. A systematic evaluation of chemicals in hydraulic –fracturing fluids and wastewater for reproductive and developmental toxicity. Journal of Exposure Science and Environmental Epidemiology 1–10.

[61] CCST. 2014. Advanced Well Stimulation Technologies in California: An Independent Review of Scientific and Technical Information. August 28, 2014; Christopher D. Kassotis, et al. 2015. Endocrine-Disrupting Activity of Hydraulic Fracturing Chemicals and Adverse Health Outcomes After Prenatal Exposure in Male Mice. Endocrinology. 156(12):4458-73. DOI: 10.1210/en.2015-1375.

[62] Khadeeja Abdullah, Timothy Malloy, Michael K. Stenstrom & I. H. (Mel) Suffet. 2016. Toxicity of acidization fluids used in California oil exploration, Toxicological & Environmental Chemistry.

[63] *Id.*

[64] *Id.*

[65] *S. Fork Band of W. Shoshone v. U.S. Dep't of Interior*, 588 F.3d 718, 726 (9th Cir. 2009).

[66] Vengosh, A. et al. 2014. A critical review of the risks to water resources from unconventional shale gas development and hydraulic fracturing in the United States. Environmental Science & Technology 48:8334-8348; Davies, R.J. et al. 2014. Oil and gas wells and their integrity: Implications for shale and unconventional resource exploitation. Marine and Petroleum Geology 56:239-254.

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increase the risk of well casing damage.[67] For example, a recent study by California scientists found that older wells can become pathways for fluid migration, and that the high injection pressures used in fracking can "increase this risk significantly."[68] For this same reason, fracking can also increase the risk of oil spills. This disposal method can also result in the contamination of drinking water.[69] But BOEM ignores these impacts.

New studies have drawn a strong connection between the recent rise in fracking wastewater injection and increased earthquake rates.[70] For example, the USGS has recognized that wastewater disposal from fracking is a "contributing factor" to the six-fold increase in the number of earthquakes in Oklahoma.[71] Another recent study also found that wastewater injection is responsible for the dramatic rise in the number of earthquakes in Colorado and New Mexico since 2001.[72] Wastewater injection has been scientifically linked to earthquakes of magnitude three and greater in at least six states: Arkansas,[73] Colorado,[74] Ohio,[75] Oklahoma,[76] Texas,[77] and New Mexico.[78] And a recent study attributed wastewater injection from fracking operations to earthquakes in California.[79]

But it is not just wastewater injection that can lead to earthquakes. The practice of fracking itself has been found to contribute directly to seismic events.[80] Even if the earthquakes that fracking directly generates are small, fracking could be contributing to increased stress in faults that leaves those faults more susceptible to otherwise naturally triggered earthquakes of a

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[67] Davies, et al. 2014; U.S. EPA, Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources, External Review Draft (June 2015) at 6-11.

[68] California Council on Science and Technology. 2015. An Independent Scientific Assessment of Well Stimulation in California, Volume II. Potential Environmental Impacts of Hydraulic Fracturing and Acid Stimulations, 20 July, at 39 ("CCST").

[69] Dominic C. DiGiulio and Robert B. Jackson. 2016. Impact to Underground Sources of Drinking Water and Domestic Wells from Production Well Stimulation and Completion Practices in the Pavillion, Wyoming, Field. Environmental Science and Technology. DOI: 10.1021/acs.est.5b04970.

[70] Van de Elst, Nicholas J. et al. 2013. Enhanced Remote Earthquake Triggering at Fluid-Injection Sites in the Midwestern United States, 341 *Science* 164.

[71] Sumy, D. F., *et al.* 2014. Observations of static Coulomb stress triggering of the November 2011 *M*5.7 Oklahoma earthquake sequence, *J. Geophys. Res. Solid Earth,* 119, 1904–1923, DOI:10.1002/2013JB010612; USGS, *Record Number of Oklahoma Tremors Raises Possibility of Damaging Earthquakes,* May 2, 2014, http://www.usgs.gov/newsroom/article.asp?ID=3880.

[72] Justin L. Rubinstein, et al. 2014. The 2001 – Present Induced Earthquake Sequence in the Raton Basin of Northern New Mexico and Southern Colorado. *Bulletin of the Seismological Society of America*, 2014 DOI: 10.1785/0120140009.

[73] E&E News, USGS, Okla. warn of more drilling-related earthquakes in State, Mike Soraghan. Oct. 25, 2013.

[74] *Id.*

[75] Ohio Dept. of Nat. Resources (2012) *Executive Summary: Preliminary Report on the Northstar 1 Class II Injection Well and the Seismic Events in the Youngstown, Ohio Area*; Fountain, Henry, Disposal halted at well after new quake in Ohio, *New York Times,* Jan. 1, 2012.

[76] Holland, Austin, Examination of possibly induced seismicity from hydraulic fracturing in the Eola Field, Garvin County, Oklahoma, Oklahoma Geological Survey Open-File Report OF1-2011 (2011).

[77] Frohlich, Cliff (2012) Two-year survey comparing earthquake activity and injection-well locations in the Barnett Shale, Texas. *Proceedings of the National Academy of Sciences.* Vol 109. No. 35.

[78] Rubinstein, J. L, et al. 2012.

[79] T. H. W. Goebel, et al. 2016. Wastewater disposal and earthquake swarm activity at the southern end of the Central Valley, California, Geophysical Research Letters. Vol. 43, Issue 3. Pages 1092–1099.

[80] Van der Elst, 2013; BC Oil & Gas Commission, Industry Bulletin: 2015-32, Dec. 15, 2015, https://www.bcogc.ca/node/12951/download.

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greater magnitude.[81] BOEM's ignores these impacts as well. The failure to take a hard look at the impacts of offshore fracking and acidizing clearly violates NEPA.

V. BOEM Failed To Adequately Consider Cumulative Impacts

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In evaluating the environmental impact of the proposed action, NEPA requires BOEM to consider and describe the direct, indirect and cumulative impacts.[82] Cumulative impacts are those impacts that "result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[83] An agency cannot avoid significance "by terming an action temporary or by breaking it down into small component parts."[84] BOEM's Draft SEIS fails to adequately consider the indirect and cumulative impacts of its proposal to adopt the preferred alternative and auction off yet more of the Gulf of Mexico to oil companies.

Specifically, BOEM's analysis of cumulative impacts is nothing more than general statements and a list of activities in the area that affect the environment. For example, the cumulative impacts "analysis" of air quality consists of nothing more than a list of broad categories of activities such as "State oil and gas programs " and "cars/trucks" that have air quality impacts.[85] It fails to mention or analyze the impacts from specific activities or projects such as BOEM's recently proposed five-year plan for 2017-2022 which would allow 10 additional lease sales in the Gulf of Mexico, or the Delfin LNG project, a floating offshore LNG facility recently proposed in the Gulf of Mexico,[86] all of which would emit greenhouse gases and exacerbate the impacts of climate change. BOEM also ignores the cumulative impacts of greenhouse gas emissions on ocean acidification and HABs.

Moreover, BOEM wholly fails to actually analyze the impacts of the proposed action in light of these other activities because non-OCS activities generate more emissions than OCS activities.[87] But NEPA requires agencies to consider *all* the significant impacts of their actions; it does not excuse consideration of one impact simply because another impact may be more significant.

A cumulative impacts analysis "must be more than perfunctory; it must provide a useful analysis of the cumulative impacts of past, present, and future projects."[88] BOEM's meager list of categories of activities and their impacts wholly fails to conduct a "quantified assessment of their [other projects] combined environmental impacts," and "objective quantification of the

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[81] Van der Elst, et al. 2013.
[82] 40 C.F.R §§ 1502.16, 1508.7, 1508.8; *Northern Plains Resource Council v. Surface Transportation Board*, 668 F.3d 1067, 1072-73 (9th Cir. 2011).
[83] 40 C.F.R. § 1508.7.
[84] *Id* at § 1508.27(b)(7).
[85] Draft SEIS at 4-9 – 4-10.
[86] 80 Fed. Reg. 45,270 (July 29, 2015).
[87] Draft SEIS at 4-10.
[88] *Klamath-Siskiyou Wildlands Ctr. v. BLM*, 387 F.3d 989, 994 (9th Cir. 2004).

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impacts" from other existing and proposed activities in the region, as required by NEPA. BOEM's analysis fails to comply with this requirement.

VI. BOEM Failed To Consider an Adequate Range of Reasonable Alternatives

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BOEM's Draft SEIS fails to analyze a reasonable range of alternatives. NEPA requires a "detailed statement" of "alternatives to the proposed action."[89] The purpose of this section is "to insist that no major federal project should be undertaken without intense consideration of other more ecologically sound courses of action, including shelving the entire project, or of accomplishing the same result by entirely different means."[90] In this way, the analysis of alternatives is the "heart of the environmental impact statement."[91]

In the alternatives analysis, the agency must "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact."[92] The analysis must "rigorously explore and objectively evaluate all reasonable alternatives."[93] While an agency is not obliged to consider every alternative to every aspect of a proposed action, the agency must "consider such alternatives to the proposed action as may partially or completely meet the proposals goal."[94]

BOEM only examined three alternatives: (A) holding the lease sale (the preferred alternative); (B) holding the lease sale except in blocks subject to the Topographic Features Stipulation; and (C) cancelling the lease sale (the purported no-action alternative).[95] Even if BOEM properly limited its purpose and need statement (which it did not), BOEM unreasonably ruled out alternatives that would restrict oil and gas development, even if they would have met the "need" of furthering the development of OCS resources. As such, BOEM failed to "rigorously explore" and "objectively evaluate" all reasonable alternatives to Lease Sale 247.

For example, BOEM failed to examine an alternative that would prohibit new oil and gas leases in designated critical habitat for the Northwest Atlantic loggerhead sea turtle distinct population segment,[96] or other biologically important areas. BOEM also failed to consider an alternative that would prohibit new oil and gas leases in the Mississippi Canyon — the site of the *Deepwater Horizon* catastrophe. BOEM also failed to examine an alternative that would limit the number of wells that could be drilled pursuant to Lease Sale 247 or an alternative that would prohibit the use of particularly dangerous drilling activities such as offshore fracking and acidizing. BOEM also failed to consider leasing the unleased areas of the Central Planning Area for offshore wind, rather than oil and gas; or consider an alternative that would end all new offshore oil and gas leasing pending a plan to limit warming to 1.5° or 2°C.

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[89] 42 U.S.C. § 4332(2)(c).
[90] *Environmental Defense Fund v. Corps of Engineers*, 492 F.2d 1123, 1135 (5th Cir. 1974).
[91] 40 C.F.R. § 1502.14.
[92] *Id.* § 1508.9.
[93] *Id.* § 1502.14.
[94] *Nat. Resources Defense Council, Inc. v. Callaway*, 524 F 2d. 79, 93 (2d Cir. 1975).
[95] *See e.g.*, Draft SEIS at 2-4.
[96] 79 Fed. Reg. 39,855 (July 10, 2014).

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Moreover, BOEM's analysis of each alternative is inadequate. BOEM acknowledges that Alternative A and Alternative B would provide for only a small percentage difference in the number of blocks offered for lease such that the level of activity would be essentially the same.[97] Indeed, BOEM estimates that the same exact amount of oil and gas would be recovered under each alternative. In other words, there is no real difference between Alternative A and B, such that Alternative B is not really an alternative at all.

And BOEM's analysis of Alternative C — the "no-action" alternative — is inadequate. First, BOEM states that the no action alternative means that the lease would not occur under the current five-year plan, but could occur pursuant to a later scheduled lease sale under the 2017-2022 five-year plan.[98] Thus, according to BOEM, the no-action alternative encompasses the same potential impacts as a decision to delay the lease sale to a later time.[99] But this approach "avoid[s] the task actually facing [BOEM]. In assuming that, no matter what, the proposed activities would surely occur, [BOEM is] neglecting to consider what would be a true 'no action' alternative."[100]

In addition, BOEM inappropriately assumes that the oil and gas that would have been extracted under Lease Sale 247 would be substituted by oil and gas or other fuels obtained elsewhere. But this assumption stands in contrast to fundamental economic theory that more supply leads to lower prices which leads to higher demand. It also ignores recent reports indicating that widespread adoption of electric vehicles could occur within the next 5 to 10 years, significantly decreasing demand.[101] And it is based on a business-as-usual regulatory regime[102] that cannot continue to exist if we are to limit global warming to 1.5°C or 2°C above pre-industrial levels consistent with the Paris Agreement.

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VII. BOEM Failed To Adequately Consider Environmental Justice Issues

From air pollution to subsistence fishing, BOEM's proposal raises significant environmental justice issues. But BOEM's Draft SEIS fails to adequately address these significant impacts.

As BOEM is well aware, on February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations." The Executive Order makes it the responsibility of each Federal agency to "make achieving environmental justice part of its mission in identify and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Accompanying this order was a Presidential Memorandum stating that "each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of

[97] Draft SEIS at 2-13.
[98] *Id.* at 2-14.
[99] *Id.*
[100] *Conservation Council of Hawaii v. NMFS*, 97 F. Supp. 3d 1210, 1236 (D. Haw. 2015).
[101] Tom Randall, Here's How Electric Cars Will Cause the Next Oil Crisis, Bloomberg, Feb. 25, 2016, http://www.bloomberg.com/features/2016-ev-oil-crisis/
[102] *See e.g.*, BOEM, Proposed Final Outer Continental Shelf Oil & Gas Leasing Program 2012–2017, 110 (2012); see also BOEM, 2012–2017 Final Programmatic Environmental Impact Statement at 4-643.

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Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the [National Environmental Policy Act]." The CEQ has also issued guidance on incorporating environmental justice considerations in the NEPA process.[103] The guidance states in part:

> Early and meaningful public participation in the federal agency decision making process is a paramount goal of NEPA. CEQ's regulations require agencies to make diligent efforts to involve the public throughout the NEPA process. Participation of low-income populations, minority populations, or tribal populations may require adaptive or innovative approaches to overcome linguistic, institutional, cultural, economic, historical, or other potential barriers to effective participation in the decision-making processes of Federal agencies under customary NEPA procedures.[104]

BOEM's actions to date, including the failure to quantify or analyze the impacts of air pollution and greenhouse gas emissions described above, undercut efforts to inform and engage environmental justice communities. States bordering the Gulf of Mexico are home to a variety of onshore oil and gas infrastructure that support offshore oil and gas drilling activities, including oil refineries. Toxic pollution from these refineries and petrochemical facilities disproportionately impact low-income neighborhoods and communities of color, and many of these same communities are expected to bear the brunt of climate disruption. BOEM's proposed Lease Sale will exacerbate these impacts by leading to more oil drilling, which will lead to more oil refining, toxic air pollution, and greenhouse gas emissions.

But BOEM fails to acknowledge these negative impacts. Rather, BOEM states that impacts from the Lease Sale will be primarily economic in nature and "have a limited but positive effect because the [Lease Sale] would contribute to the sustainability of the current industry, related support services, and associated employment, especially in Louisiana, where an extensive concentration of OCS oil- and gas-related infrastructure is located."[105] BOEM's failure to quantify and describe the negative impacts that could result from its proposal fails to comply with its duty to disclose the environmental justice implications of its proposal.

BOEM's analysis of the cumulative impacts of its proposal on environmental justice communities is inadequate for the same reason. Indeed, BOEM wholly dismisses the import of the additional air pollution that could result from the Lease Sale because there is already significant OCS-related infrastructure in the Gulf states, particularly in Louisiana.[106] This approach undercuts the entire purpose of a cumulative impacts analysis and efforts to inform and engage environmental justice communities.

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[103] CEQ, Environmental Justice: Guidance Under the National Environmental Policy Act, http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf.
[104] *Id.* at 13.
[105] Draft SEIS at 4-99.
[106] *Id.* at 4-100.

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VIII. BOEM Should Complete Consultation Under the Endangered Species Act Before Holding Lease Sale 247

Lease Sale 247 requires consultation under Section 7 of the Endangered Species Act ("ESA"). In enacting the ESA, Congress recognized that certain species "have been so depleted in numbers that they are in danger of or threatened with extinction."[107] Accordingly, a primary purpose of the ESA is "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such . . . species."[108]

To reach these goals, Section 9 of the ESA prohibits any person, including any federal agency, from "taking" any endangered species without proper authorization through a valid incidental take permit.[109] The term "take" is statutorily defined broadly as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[110] The definition of "harm" has been defined broadly by regulation as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering."[111] Courts have found federal agencies liable for take of listed species where agency-authorized activities resulted in the killing or harming of ESA-listed species.[112]

Additionally, Section 7(a)(2) of the ESA requires federal agencies to "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any [listed] species or result in the destruction or adverse modification of [the critical] habitat of such species."[113] "Action" is broadly defined to include "all activities or programs of any kind authorized, funded, or carried out, in whole or in part" by federal agencies and include granting permits and licenses, as well as actions that may directly or indirectly cause modifications to the land, water, or air.[114]

To facilitate compliance with Section 7(a)(2), an "agency shall . . . request" from the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (collectively, the "Services") information regarding whether any listed species "may be present" in a proposed action area, and if so, the "agency shall conduct a biological assessment" to identify species likely to be affected.[115] The agency must then initiate formal consultation with the Services if a

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[107] 16 U.S.C. § 1531(a)(2).
[108] *Id.* § 1531(b).
[109] 16 U.S.C. § 1538(a)(1)(B); *see also* 50 C.F.R. § 17.31(a) (extending the "take" prohibition to threatened species managed by the U.S. Fish and Wildlife Service).
[110] 16 U.S.C. § 1532(19).
[111] 50 C.F.R. § 17.3; *see also Babbitt v. Sweet Home Ch. Of Communities for a Great Oregon*, 515 U.S. 687 (1995) (upholding regulatory definition of harm).
[112] *See e.g., Defenders of Wildlife v. Envtl. Prot. Agency*, 882 F.2d 1294, 1300-01 (8th Cir. 1989); *Strahan v. Coxe*, 127 F.3d 155, 163 (1st Cir. 1997).
[113] 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(a).
[114] 50 C.F.R. § 402.02.
[115] 16 U.S.C. § 1536(c).

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proposed action "may affect" any of those listed species.[116]

After formal consultation, the Services issue a biological opinion to determine whether the agency action is likely to "jeopardize" any species' existence. If so, the opinion may specify reasonable and prudent alternatives that avoid jeopardy.[117] If the Services conclude that the action or the reasonable and prudent alternatives will not cause jeopardy, the Services will issue an incidental take statement ("ITS") that specifies "the impact, i.e., the amount or extent, of . . . incidental taking" that may occur.[118] When those listed species are marine mammals, the take must first be authorized pursuant to the MMPA, and the ITS must include any additional measures necessary to comply with the MMPA take authorization.[119] The take of a listed species in compliance with the terms of a valid ITS is not prohibited under Section 9 of the ESA.[120]

But an agency's consultation duties do not end with the issuance of a biological opinion. Instead, an agency must reinitiate consultation when: (1) the amount of take specified in the ITS is exceeded; (2) new information reveals that the action may have effects not previously considered; or (3) the action is modified in a way not previously considered.[121] Finally, after consultation is reinitiated, ESA Section 7(d) prohibits the agency from "mak[ing] any irreversible or irretrievable commitment of resources" toward a project that would "foreclos[e] the formulation or implementation of any reasonable and prudent alternative measures."[122] The 7(d) prohibition "is in force during the consultation process and continues until the requirements of section 7(a)(2) are satisfied."[123]

As recognized in BOEM's Draft SEIS, several federally threatened and endangered species are found in the Gulf of Mexico's Central Planning Area and may be impacted by Lease Sale 247; the Lease Sale also impacts critical habitat for ESA-listed species. Thus, Section 7 of the ESA is clearly triggered. While BOEM reinitiated Section 7 consultation following the *Deepwater Horizon* oil spill, it has not yet completed such consultation. Accordingly, BOEM should suspend approval of leasing and site-specific drilling activities until consultation is complete in order to ensure that its actions do not jeopardize listed species or their critical habitat and that such approvals do not "foreclos[e] the formulation or implementation of any reasonable and prudent alternative measures."[124]

IX. Conclusion

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In sum, Lease Sale 247 would cause a wide variety of serious harms to the environment, including greenhouse gas emissions that will exacerbate climate change, oil spills, and further impacts to already imperiled wildlife and local communities, many of which are still suffering

[116] 50 C.F.R. § 402.14(a); 51 Fed. Reg. 19,926 (June 3, 1986) ("may affect" broadly includes "[a]ny possible effect, whether beneficial, benign, adverse or of an undetermined character").
[117] 16 U.S.C. § 1536(b); 50 C.F.R. § 402.14(h)(3).
[118] 50 C.F.R. § 402.14(h)(3).
[119] *Id.*
[120] 16 U.S.C. §§ 1536(b)(4), (o)(2); 50 C.F.R. § 402.14(i)(5).
[121] 50 C.F.R. §§ 402.16; 402.14(h)(3).
[122] 16 U.S.C. § 1536(d).
[123] 50 C.F.R. § 402.09.
[124] 16 U.S.C. § 1536(d).

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the effects of the *Deepwater Horizon* oil spill nearly six years later. Accordingly, the Center urges BOEM to cancel the lease sale and keep dirty fossil fuels in the ground.

If BOEM nevertheless decides to proceed with the Lease Sale, BOEM must first address and remedy the numerous deficiencies within the Draft SEIS and must circulate a revised Draft SEIS for public comment. BOEM's new NEPA analysis must, among other revisions, take the requisite hard look at the impacts of Lease Sale 247 by quantifying and analyzing the greenhouse gas emissions that could result from the Lease Sale and must analyze a reasonable range of alternatives, including an alternative that considers halting all new offshore oil and gas leases to avoid the most catastrophic impacts of climate change.

Sincerely,

/s/ Kristen Monsell

Kristen Monsell
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Enc: Cited references

Attachments

4-10-2016_Corrigendu

Ackerman_SCC_economics_2012-10

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Colborn_2011_Natural_Gas_from_a_public_health_perspective

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DiGiulio-Jackson-drinking-water-aquifers-proven-contaminated-by-Encana-acidizing-fracing-at-Pavillion-Wyoming

Enhanced remote earthquake triggering at fluid-injection sites in the Midwestern United States

da-seizures-in-csls

espèces-migrent-nord-et-haut

epa_og_prop_ria_081815

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'Red Tide' Turns Gulf of Mexico Rust-Colored

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Sumy earthquakes

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Warren CC Impacts 2010

Vengosh 2014_Critical review of risks to water resources from unconv shale gas dvlpment and HF

CBD-1 Comment noted.

CBD-2 The 2012-2017 WPA/CPA Multisale EIS is the programmatic EIS that established the framework for subsequent environmental documents associated with the 2012-2017 Five-Year Program in the Gulf of Mexico. This and prior Supplemental EISs tier from and incorporate by reference information from the 2012-2017 WPA/CPA Multisale EIS and the other prior 2012-2017 Gulf of Mexico EISs and consider activities on a regional or subregional scale. In order to make an informed decision on a single lease sale, the analyses contained in the 2012-2017 WPA/CPA Multisale EIS examine impacts from a single CPA lease sale. A lease sale scenario, described in **Chapter 3**, includes all of the activities that could occur over a 40-year analysis period. The findings of these analyses can be applied individually to each of the subsequent proposed lease sales. This Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs. This Supplemental EIS should not be considered a stand-alone document.

The preparation of a lease sale EIS or Supplemental EIS is considered part of the prelease process. Information about the prelease process can be found in Chapter 1.4 of the 2012-2017 WPA/CPA Multisale EIS and **Chapter 1.4** of this Supplemental EIS. Following the prelease process, after a decision is made to hold a lease sale and leases are awarded, additional environmental reviews take place prior to the implementation of most site-specific activities. To ensure conformance with the OCSLA, other laws, and applicable regulations and lease provisions, BOEM conducts technical reviews of proposed postlease activities. Postlease activities include oil and natural gas exploration, development, and production operations. Industry submits formal plans for review and approval before any project-specific activities, except for ancillary activities (such as geological and geophysical activities or studies that model potential oil and hazardous substance spills), can begin on a lease. BOEM reviews those OCS plans and, at that time, makes a determination regarding the level of additional environmental review and evaluation required for the site-specific activity. Even when an action falls within an existing categorical exclusion and no extraordinary circumstances are present, BOEM still thoroughly evaluates each proposed action to determine if it complies with all statutory and regulatory requirements. The level of review depends upon the type and the location of the activity. Site-specific attributes are considered in the postlease activity reviews.

CBD-3 The purpose and need identified in this Supplemental EIS and the prior 2012-2017 Gulf of Mexico EISs are derived from BOEM's Congressional mandate as stated in the OCSLA of 1953 (67 Stat. 462), as amended (43 U.S.C. §§ 1331 *et seq*.). As described in Chapter 1.1 of the 2012-2017 WPA/CPA Multisale EIS, the purpose and need of this proposed action flows from DOI's role to manage the leasing, exploration, development, and production of oil and gas resources on the Federal OCS. The Secretary of the Interior oversees the OCS oil and gas program and is required to balance orderly resource development with protection of the human, marine, and coastal environments while simultaneously ensuring that the public receives an equitable return for these resources and that free-market competition is maintained.

This Supplemental EIS considered three alternatives: Alternative A, a leasing alternative with some Congressionally mandated deferrals; Alternative B, a leasing alternative with some Congressionally mandated deferrals and an exclusion related to unleased areas that are subject to the Topographic Features Stipulation, which is an alternative that includes additional environmental protection to important benthic communities; and the No Action Alternative, which is the cancellation of the proposed lease sale. As described in Chapter 2.2.1.2 of the 2012-2017 WPA/CPA Multisale EIS, additional alternatives and deferrals were considered but not analyzed in detail. Broadly put, those alternatives and deferrals included excluding deep water and limiting leasing to shallow waters, delaying leasing until drilling

safety is improved, prohibiting drilling in areas with strong ocean currents such as the Loop Current, delaying leasing until the state of the Gulf of Mexico baseline is known, and identifying and protecting sensitive ecosystems.

This Supplemental EIS is not a decision document. The DOI's Assistant Secretary for Land and Minerals Management will make a decision on the CPA proposed action. If the decision is to hold the proposed lease sale, it will be announced in the Final Notice of Sale and Record of Decision.

CBD-4 As stated in the response to comment CBD-2, this Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs and should not be considered a stand-alone document.

BOEM recognizes the importance of climate change, both in its potential to impact changing environmental baselines and resources and the potential contributions to climate change from BOEM's actions. BOEM considers many facets of the potential effects of climate change in its decisionmaking with respect to oil and gas leasing, whether in the Five-Year Program or lease sale analyses. Refer to the 2012-2017 WPA/CPA Multisale EIS for additional information about GHG emissions and climate change.

Detailed information about direct and indirect contributions to GHG emissions on the OCS associated with the CPA proposed action can be found in Chapter 4.2.1.1 of the 2012-2017 WPA/CPA Multisale EIS, which describes the projected annual direct emissions for the CPA proposed action's routine activities, i.e., platform construction and emplacement, platform operations, drilling activities, flaring, seismic survey and support-vessel operations, pipeline laying and burial operations, evaporation of volatile petroleum hydrocarbons during transfers, and fugitive emissions. It is projected that the annual CO_2 emissions from OCS oil- and gas-related activities in the WPA and CPA are estimated at 0.34 and 1.3 million tons, respectively. In 2014, total U.S. greenhouse gas emissions were 6.87 billion metric tons CO_2 equivalents. Total U.S. emissions have increased by 7.4 percent from 1990 to 2014, and emissions have increased by 1.0 percent from 2013 to 2014. The CO_2 equivalent emissions from, specifically, OCS oil and gas sources is 0.4 percent of the United States' GHG Inventory. The amount of CO_2 emissions from a typical well site on average is about 237-439 tons per year. This is well below the reporting thresholds under the GHG Reporting Rule. Given these direct emissions estimates, GHG emissions attributable to the CPA and WPA would not be expected to contribute significantly to global warming or climate change.

Additional information about GHG emissions can be found in Chapters 4.2.1.1.1 and 4.2.1.1.2 of the 2012-2017 WPA/CPA Multisale EIS. The 2012-2017 WPA/CPA Multisale EIS also contains information about the programmatic aspects of climate change relative to the environmental baseline for the Gulf of Mexico OCS Program within each resource chapter found in Chapter 4.2, Appendix A.6, and Appendix G.3 of the 2012-2017 WPA/CPA Multisale EIS.

As noted by the commenter, the goal of a 2° Celsius goal was adopted in 2010 at the 16th session of the Conference of the Parties (COP 16) and has since been endorsed as a fundamental goal of the Paris Agreement, which was adopted in December 2015 and signed by the U.S. in April 2016. Growing out of the Paris Agreement, the United States set a goal to reduce its GHG emissions by 26-28 percent below its 2005 level by 2025. BOEM recognizes the importance of the recently articulated, global fossil fuel consumption budget designed to help achieve the goal of limiting global temperature increase to less than 2° Celsius, including the relative contribution from consumed OCS oil and gas. BOEM considered the GHG emissions from the consumption of OCS oil and gas at the programmatic level given that consumption is primarily related to nationwide supply and demand and because it is highly speculative to indicate where and to what extent OCS oil and

gas will contribute to any future U.S. consumption budgets. An additional discussion of BOEM's programmatic analysis of GHG emissions has been added to **Chapter 4.1.1.1**.

Lifecycle analysis has, in part, been bounded by recent court decisions (Center for Biological Diversity v. U.S. Department of the Interior, D.C. Circuit, No. 07-1247, April 2009; Native Village of Point Hope v. Secretary Salazar, District Court of Alaska, 1:08-cv-0004-RRB, Order of Dismissal, February 2012). Recent court decisions have upheld BOEM's policy not to analyze GHG emission and climate change effects related to consumption; however, BOEM continues to consider different ways to quantitatively address and disclose downstream GHG emissions and effects provided the analysis can be made meaningful, efficient, and, ideally, used to differentiate or help inform the choice between alternatives.

CBD-5 Comment noted.

CBD-6 As stated in the response to comment CBD-2, this Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs and should not be considered a stand-alone document. Additional information about fracking can be found in Chapter 3.1.1.3 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS.

Chapter 3.1.1.3 of this Supplemental EIS has been expanded to provide additional information on Gulf of Mexico well completion and stimulation techniques and the regulatory requirements associated with these oil recovery techniques. The onshore operations associated with the occurrence of increased seismic activity tend to use much higher volumes of water and proppants and create much more expansive fractures in the formation to stimulate the flow of natural gas or oil. The primary drivers of offshore completions in the GOM, however, are sand control and formation stimulation with an extensive history of successful application. In contrast to the large-scale, induced hydraulic fracturing procedures commonly used in onshore oil and gas operations for low-permeability "tight gas," "tight oil," and "shale gas" reservoirs, the vast majority of hydraulic fracturing treatments carried out on the OCS in the GOM are "frac packs," which are small scale by comparison. Since formation "damage" caused by drilling operations does not extend for large distances away from the reservoir-borehole interface, the fracturing induced by "frac packs" is also designed to remain in close proximity to the borehole, extending distances of typically 15-30 m (49-98 ft) from the borehole (Ali et al., 2002; Sanchez and Tibbles, 2007) to prevent the production of formation fines and sand. To BOEM's knowledge, there have been no reported or documented seismic events linked to OCS well stimulation activities in the GOM.

This Supplemental EIS also provides further discussion of USEPA Regions 4 and 6 jurisdictional oversight of all waste streams generated from offshore oil and gas activities through their general permits. Each USEPA region has promulgated general permits for discharges that incorporate the 1993 and 2001 effluent guidelines for SBF-wetted cuttings as a minimum.

Permits issued under Section 402 of the Clean Water Act for offshore activities must comply with any applicable water quality standards and/or Federal water quality criteria, as well as Section 403 of the CWA. Water quality standards consist of the waterbody's designated uses, water quality criteria to protect those uses and to determine if they are being attained, and antidegradation policies to help protect high-quality waterbodies. Discharges from offshore activities near State water boundaries must comply with all applicable State Water Quality Standards.

Section 403 of the Clean Water Act requires that NPDES permits for discharges to the territorial seas (baseline to 3 mi [5 km]), contiguous zone, and ocean be issued in compliance with USEPA's regulations for preventing unreasonable degradation of the receiving waters. Prior to permit issuance, ocean discharges must be evaluated against USEPA's published criteria for determination of unreasonable degradation. Unreasonable degradation is defined in the NPDES regulations (40 CFR § 125.1211(e)) as the following:

- significant adverse changes in ecosystem diversity, productivity, and stability of the biological community within the area of discharge and surrounding biological communities;
- threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms; and
- loss of aesthetic, recreational, scientific, or economic values, which is unreasonable in relation to the benefit derived from the discharge.

CBD-7 Refer to Chapter 3.3 of the 2012-2017 WPA/CPA Multisale EIS ("Cumulative Activities Scenario") for a description of the past, present, and reasonably foreseeable future human activities, including non-OCS oil- and gas-related activities, as well as all OCS oil- and gas-related activities, that may affect the biological, physical, and socioeconomic resources of the Gulf of Mexico. The OCS Program scenario includes all activities that are projected to occur from past, proposed, and future lease sales during the 40-year analysis period (2012-2051). This includes projected activity from lease sales that have been held, but for which exploration or development has not yet begun or is continuing. In addition to human activities, impacts from natural occurrences, such as hurricanes, are analyzed.

Chapter 4 of the 2012-2017 WPA/CPA Multisale EIS presents a cumulative analysis that considers environmental and socioeconomic impacts that may result from the incremental impact of the proposed action when added to all past, present, and reasonably foreseeable future activities, including non-OCS oil- and gas-related activities such as import tankering and commercial fishing, as well as all OCS activities (OCS Program). The OCS Program scenario includes all activities that are projected to occur from past, proposed, and future lease sales during the 40-year analysis period (2012-2051). This includes projected activity from lease sales that have been held but for which exploration or development has not yet begun or is continuing. In addition to human activities, impacts from natural occurrences, such as hurricanes, are analyzed. An analysis of the potential impacts of routine activities and accidental events associated with the CPA proposed action and the proposed action's incremental contribution to the cumulative impacts are described in Chapter 4.2 of the 2012-2017 WPA/CPA Multisale EIS.

CBD-8 The 2012-2017 WPA/CPA Multisale EIS is the programmatic EIS that established the framework for subsequent environmental documents associated with the 2012-2017 Five-Year Program in the Gulf of Mexico. This and prior Supplemental EISs tier from and incorporate by reference information from the 2012-2017 WPA/CPA Multisale EIS and the other prior 2012-2017 Gulf of Mexico EISs and consider activities on a regional or subregional scale. This Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs. This Supplemental EIS should not be considered a stand-alone document. Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and substitution effects.

This Supplemental EIS considered three alternatives: Alternative A, a leasing alternative with some Congressionally mandated deferrals; Alternative B, a leasing alternative with some

Congressionally mandated deferrals and an exclusion related to unleased areas that are subject to the Topographic Features Stipulation, which includes additional environmental protection to important benthic communities; and the No Action Alternative, which is the cancellation of the proposed lease sale. BOEM explains that canceling the proposed lease sale would eliminate the effects described under the action alternatives. The incremental contribution of a proposed lease sale to cumulative effects would also be avoided, but the effects from other activities, including other OCS lease sales, would remain. This is explained in greater detail in the 2012-2017 WPA/CPA Multisale EIS. The 2012-2017 WPA/CPA Multisale EIS also provides information about other alternatives considered. The explanation as to why a particular alternative was not analyzed in detail is provided in Chapter 2.2.1.2 of the 2012-2017 WPA/CPA Multisale EIS. Broadly put, those alternatives and deferrals included excluding deep water and limiting leasing to shallow waters, delaying leasing until drilling safety is improved, prohibiting drilling in areas with strong ocean currents such as the Loop Current, delaying leasing until the state of the Gulf of Mexico baseline is known, and identifying and protecting sensitive ecosystems.

CBD-9 Refer to Chapter 4.2.1.23.4 of the 2012-2017 WPA/CPA Multisale EIS for a detailed discussion of environmental justice issues associated with the CPA proposed action, including accident events.

In **Chapter 4.1.1.23.4** of this Supplemental EIS and in accordance with 40 CFR § 1502.22, BOEM has identified unavailable information regarding the impacts of the *Deepwater Horizon* explosion, oil spill, and response related to environmental justice, including long-term and cumulative health impacts to oil-spill cleanup workers and issues relating to subsistence and other indigenous reliance on natural resources. This information cannot be obtained because long-term health impact studies, subsistence studies, and the NRDA process are ongoing, and data from these efforts will be unavailable and unobtainable until the studies and NRDA process are complete. In order to fill this data gap, BOEM used existing information and reasonably accepted scientific methodologies to extrapolate from available information in completing the relevant analysis, including limited information that has been released after the *Deepwater Horizon* explosion, oil spill, and response and studies of past oil spills, which indicate that a low-probability, catastrophic oil spill, which is not part of the CPA proposed action and not likely expected to occur, may have significant adverse impacts on low-income and minority communities.

BOEM's Environmental Studies Program continues to participate in and fund studies of OCS lands and resources. One BOEM-sponsored study that is currently underway is "Subsistence in Coastal Louisiana: An Exploratory Study." When this study is completed, BOEM will consider the findings of the study in future NEPA analyses.

CBD-10 BOEM and the BSEE are currently in consultation with the NMFS and FWS regarding the OCS oil and gas program in the Gulf of Mexico. BOEM is acting as the lead agency in the ongoing consultation, with BSEE's assistance and involvement. The programmatic consultation was expanded in scope after the reinitiation of consultation by BOEM following the *Deepwater Horizon* explosion and oil spill, and it will include both existing and future OCS oil and gas leases in the Gulf of Mexico over a 10-year period. This consultation also considers any changes in baseline environmental conditions following the *Deepwater Horizon* explosion, oil spill, and response. The programmatic consultation will also include postlease activities associated with OCS oil- and gas-related activities in the Gulf of Mexico, including G&G and decommissioning activities.

Following the *Deepwater Horizon* explosion and oil spill, BOEM requested reinitiation of ESA Section 7 consultation with the NMFS and FWS. While the programmatic Biological Opinion is in development, BOEM and the NMFS's Southeast Regional Office have agreed to interim consultations on postlease approvals. The interim process allows BOEM to operate under the existing Biological Opinion with additional requirements. The current oil

and gas programmatic consultations with the NMFS and FWS should close out all past Biological Opinions in the GOM going forward.

CBD-11 Comment noted.

April 11, 2016

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Re: Draft Supplemental Environmental Impact Statement (EIS) for the proposed Gulf of Mexico Central Planning Area (CPA) Lease Sale 247 [BOEM-2015-0401]

On behalf of forty environmental, social justice, and indigenous groups, we, the undersigned, urge you to cancel Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis. The Bureau of Ocean Energy Management is proposing to offer 47.4 million acres for offshore oil and gas leasing in March 2017. Instead, the federal government urgently needs to end all new leases for fossil fuels on public lands and keep offshore oil and gas in the ground.

The Bureau has the authority and duty to cancel this lease sale. The Outer Continental Shelf (OCS) Lands Act provides for the development of offshore oil and gas subject to environmental safeguards and consistent with national needs. 43 U.S.C. § 1332(3). The Act mandates that the management of the OCS consider "economic, social and environmental values" and specifically requires that oil and gas development be balanced "with protection of the human, marine, and coastal environments." *Id.* § 1802(2). Holding Lease Sale 247, which would lead to the development of new offshore oil and gas reserves, is wholly inconsistent with our nation's need to limit greenhouse gas emissions by keeping fossil fuels in the ground. The agency has authority to cancel this lease sale, 43 U.S.C. § 1331(e), as demonstrated by the Bureau's cancellation of two lease sales in the Arctic.[1]

CBD2-1

The flawed draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking. These harmful effects of the lease sale must be fully disclosed and evaluated, and they counsel toward cancelling the sale.

First, the greenhouse gas emissions resulting from the lease sale will impede the ability of the United States to meet international climate targets. Recently in Paris, the United States and other countries agreed to reduce greenhouse gas emissions. The Paris Agreement commits all

[1] BOEM, Cancellation of Oil and Gas Lease Sale 237 in the Chukchi Sea Planning Area on the Outer Continental Shelf (OCS), 80 Fed. Reg. 74796 (Nov. 30, 2015); BOEM, Cancellation of Oil and Gas Lease Sale 242 in the Beaufort Sea Planning Area on the Outer Continental Shelf (OCS), 80 Fed. Reg. 74797 (Nov. 30, 2015).

signatories to an articulated target to hold the long-term global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels."[2]

The United States must leave the remaining OCS areas unleased for oil and gas development to ensure a reasonable probability of limiting warming to 1.5°C. To have even a 50% probability of achieving the Paris Agreement goal of limiting warming to 1.5°C above pre-industrial levels equates to a carbon budget of 550-600 $GtCO_2$ from 2011 onward,[3] of which more than 100 $GtCO_2$ has already been emitted. The United States alone would use up the remaining carbon budget from federal and private fossil fuel reserves that are already leased.

CBD2-2

The draft supplement fails to evaluate the greenhouse gas consequences and social impact of the lease sale. The Gulf of Mexico and its people are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe. The draft supplement estimates the lease sale will produce 0.46-0.89 billion barrels of oil and 1.9-3.9 trillion cubic feet of natural gas, but it neither calculates the greenhouse gas pollution from using that oil and gas nor discusses the environmental consequences of those emissions.

CBD2-3

Second, offshore drilling is a dangerous and dirty industry with a history of accidents that have spilled oil in sensitive marine environments and taken lives. Hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering from the impacts of BP's 2010 Deepwater Horizon oil spill. New scientific research documents severe lung disease, reproductive failure and mortality of oil-exposed dolphins; a "bathtub ring" of subsea oil; one million birds killed; sea turtles, marine mammals, and corals injured and killed; damaged wetlands; and corroded shipwrecks among other continuing harms.[4] The draft

[2] Paris Agreement, Art. 2.

[3] IPCC AR5 Synthesis Report at 64 & Table 2.2.

[4] Putman, NF; Alberto Abreu-Grobois, Iñaky Iturbe-Darkistade, Emily M. Putman, Paul M. Richards, Philippe Verley. Deepwater Horizon oil spill impacts on sea turtles could span the Atlantic. Biology Letters (2015); Valentine DL, GB Fisher, SC Bagby, RK Nelson, CM Reddy, SP Sylva, and MA Woo, Fallout plume of submerged oil from *Deepwater Horizon*, *PNAS* (2014); Haney, JC, HJ Geiger and JW Short, Bird Mortality from the Deepwater Horizon oil spill. I Exposure probability in the offshore Gulf of Mexico. Marine Ecology Progress Series. 513:225-237 (2014); Haney CJ, Geiger HJ, Short JW Bird mortality from the Deepwater Horizon oil spill. II. Carcass sampling and exposure probability in the coastal Gulf of Mexico. Mar Ecol Prog Ser 513:239–252 (2014); Lane SM et al.Reproductive outcome and survival of common bottlenose dolphins sampled in Barataria Bay, Louisiana, USA, following the Deepwater Horizon oil spill. Proc. R. Soc. B 282: 20151944 (2015); Shwacke LH, Smith CR, Townsend FI, Wells RS, Hart LB, Balmer BC, Collier TK, De Guise S, Fry MM, Guillette LJ, Jr. et al. Response to Comment on Health of Common Bottlenose Dolphins (Tursiops truncatus) in Barataria Bay, Louisiana Following the Deepwater Horizon Oil Spill. Environmental Science & Technology 48(7):4209-4211 (2014); White HK, Hsing PY, Cho W, Shank TM, Cordes EE, Quattrini AM, Nelson RK, Camilli R, Demopoulos AW, German CR et al. Impact of the Deepwater Horizon oil spill on a deep-water coral community in the Gulf of Mexico. Proceedings of the National Academy of Sciences of the United States of America 109(50):20303-8 (2012); Goodbody-Gringley G, Wetzel DL, Gillon D, Pulster E, Miller A, Ritchie KB. 2013. Toxicity of Deepwater Horizon Source Oil and the Chemical Dispersant, Corexit® 9500, to Coral Larvae. PLoS ONE 8(1):e45574 (2013); Mendelssohn IA, Andersen

supplement inadequately addresses the Gulf's degraded conditions and inevitable risk of oil spills resulting from the lease.

CBD2-3

Oil spills have devastating impacts on human health and Gulf Coast economy. Key fishing areas have still not recovered from the Macondo well blowout. Further, leading companies cannot guarantee being able to stop a deepwater well blowout. There is little assurance in the ability of the technology to cap a blowout at 10,000 ft. or greater. The new capping technology is not designed for that depth and pressure[5] according to a manufacturer and United States Coast Guard.

CBD2-4

Third, the draft supplement acknowledges that the lease will increase offshore fracking, but it ignores the environmental effects of this practice. Offshore hydraulic fracturing causes water and air pollution, and increases the risk of oil spills and earthquakes. Oil companies are allowed to dump their wastewater — including fracking chemicals — into the Gulf of Mexico, which may harm the Gulf's sensitive wildlife. Many fracking chemicals are known to be toxic to people and marine animals. For example, 40% of the chemicals added to fracking fluids have ecological effects, meaning they can harm aquatic and other wildlife.[6] An analysis of the chemicals used during offshore fracking events in California between 2011 and 2013 found scientific studies indicating that many of the chemicals could kill or harm a broad variety of marine organisms, including sea otters, fish, and invertebrates.[7] Numerous scientists and reports have linked fracking to water contamination, air contamination, spills, earthquakes and birth defects.[8]

CBD2-5

Moreover, market conditions and preexisting leases support the cancellation of Lease Sale 247. Nearly 72% of offshore leases in the Gulf of Mexico are not under active exploration or development.[9] This means that 26 million leased acres are already available for oil and gas

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GL, Baltz DM, Caffey RH, Carman KR, Fleeger JW, Joye SB, Lin Q, Maltby E, Overton EB et al. Oil Impacts on Coastal Wetlands: Implications for the Mississippi River Delta Ecosystem after the Deepwater Horizon Oil Spill. Bioscience 62(6):562-574 (2012)

[5] Marine Well Containment Company, Containment System Overview, http://www.marinewellcontainment.com/containment-system/

[6] Colborn, T. et al. Natural gas operations from a public health perspective. Human and Ecological Risk Assessment 17: 1039-1056 (2011).

[7] The oil and gas industry has successfully resisted the full disclosure of fracking chemicals. However, since January 1, 2014, interim regulations under SB4 requires operators to disclose the chemicals used in their operations in a publicly available chemical report within 60 days of completion.

[8] *See e.g.*, Goebel, T. H. W., S. M. Hosseini, F. Cappa, E. Hauksson, J. P. Ampuero, F. Aminzadeh, and J. B. Saleeby (2016), Wastewater disposal and earthquake swarm activity at the southern end of the Central Valley, California, Geophys. Res. Lett., 43, doi:10.1002/2015GL066948;
Ellen Webb, et al. 2014. Developmental and reproductive effects of chemicals associated with unconventional oil and natural gas operations. Reviews on Environmental Health. Vol. 29, Issue 4, pp. 307–318, ISSN (Online) 2191-0308, ISSN (Print) 0048-7554. doi: 10.1515/reveh-2014-0057; California aquifers contaminated with billions of gallons of fracking wastewater, RT.com, Oct. 2014, https://www.rt.com/usa/194620-california-aquifers-fracking-contamination/; Fontenot, Brian E, et al. 2013. An evaluation of water quality in private drinking water wells near natural gas extraction sites in the Barnett Shale Formation. *Environ. Sci. Technol.* 47 (17), pp 10032–10040; doi: 10.1021/es4011724.

[9] Department of Interior, Oil and Gas Lease Utilization, Onshore and Offshore (May 2012).

CBD2-5 production with18 billion barrels of oil and 50 trillion cubic feet of natural gas in the pipeline. Another lease sale is unnecessary given low oil prices, idle leases, and significant fossil fuels and greenhouse gases awaiting exploitation.

CBD2-6 In conclusion, we urge you cancel Lease Sale 247 and select Alternative C — the no action alternative. This will avoid the harmful effects of the lease sale to the Gulf of Mexico environment and the climate. It is the only action consistent with preserving our nation's ability to meet our obligations to reduce greenhouse gas levels and limit warming to 1.5°C.

Sincerely,

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Danielle Redmond
Organizer
Alaska Climate Action Network

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Student

CBD2-1 The programmatic EIS that established the framework for subsequent environmental documents associated with the 2012-2017 Five-Year Program in the Gulf of Mexico is the *Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; Central Planning Area Lease Sales 227, 231, 235, 241, and 247, Final Environmental Impact Statement* (2012-2017 WPA/CPA Multisale EIS) (USDOI, BOEM, 2012b). This Supplemental EIS tiers from and incorporates by reference information from the 2012-2017 WPA/CPA Multisale EIS and the other prior 2012-2017 Gulf of Mexico EISs including the *Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231, Final Supplemental Environmental Impact Statement* (WPA 233/CPA 231 Supplemental EIS) (USDOI, BOEM, 2013a); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2015-2017; Central Planning Area Lease Sales 235, 241, and 247, Final Supplemental Environmental Impact Statement* (CPA 235/241/247 Supplemental EIS) (USDOI, BOEM, 2014a); and *Gulf of Mexico OCS Oil and Gas Lease Sales: 2016 and 2017; Central Planning Area Lease Sales 241 and 247; Eastern Planning Area Lease Sale 226, Final Supplemental Environmental Impact Statement* (CPA 241/247 and EPA 226 Supplemental EIS) (USDOI, BOEM, 2015a).

This Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs and should not be considered a stand-alone document. As such, some information may be found and referenced in the prior 2012-2017 Gulf of Mexico EISs per CEQ regulations (40 CFR § 1502.20).

Information about GHG emissions can be found in Chapters 4.2.1.1.1 and 4.2.1.1.2 of the 2012-2017 WPA/CPA Multisale EIS. The 2012-2017 WPA/CPA Multisale EIS also contains information about the programmatic aspects of climate change relative to the environmental baseline for the Gulf of Mexico OCS Program within each resource chapter found in Chapter 4.2, Appendix A.6, and Appendix G.3 of the 2012-2017 WPA/CPA Multisale EIS.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, may be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Information about fracking can be found in Chapter 3.1.1.3 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226, and **Chapter 3.1.1.3** of this Supplemental EIS.

CBD2-2 Information about the programmatic aspects of climate change relative to the environmental baseline for the Gulf of Mexico OCS Program can be found within each resource chapter found in Chapter 4.2, Appendix A.6, and Appendix G.3 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected sea-level rise and subsidence can be found in Chapter 3.3.4.1 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected impacts related to coastal erosion, subsidence, and coastal storms on low-income and minority communities can be found in Chapter 4.2.1.23.4 of the 2012-2017 WPA/CPA Multisale EIS. While all human activities and natural events and processes also may raise environmental justice issues (e.g., displacement of Tribal communities), the cumulative consequences to environmental justice cannot be determined and, when added to existing State and Federal leasing programs, the associated onshore infrastructure, onshore and offshore OCS oil- and gas-related activities, and all of the non-OCS oil- and gas-related impacting factors, a single proposed CPA lease sale would make miniscule contributions to the cumulative effects on low-income and minority populations along the Gulf Coast.

Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and substitution effects.

CBD2-3 As information about the impacts of the *Deepwater Horizon* explosion, oil spill, and response have become available, BOEM has considered and incorporated additional information during the preparation of this Supplemental EIS. Below is a listing of 41 recent studies and information related to *Deepwater Horizon* impacts that were cited and used to inform the analyses contained in this Supplemental EIS. Included in this list of the 41 recent of studies and information is the *Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement* prepared by the NRDA Trustees, which summarizes their *Deepwater Horizon* oil-spill injury assessment.

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In addition, information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

CBD2-4 Information about fracking can be found in Chapter 3.1.1.3 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 3.1.1.3** of this Supplemental EIS. **Chapter 3.1.1.3** of this Supplemental EIS has been updated since the publication of the Draft Supplemental EIS.

The use of well stimulation treatments supports the continued recovery of oil as primary recovery of an oil and/or gas reservoir declines. These activities are covered by a permit known as an Application for Permit to Modify. All Applications for Permit to Modify are reviewed and approved by the BSEE. BOEM carries forward any established mitigating measures based upon lease stipulations/terms, regulatory requirements, etc., to the individual plan actions. The primary impact-producing factor of concern related to well stimulation activities in the Gulf of Mexico OCS would be discharges of well TCW fluids. Well TCW fluids are commingled with other produced fluids and are regulated as produced water through the NPDES permit process. Because TCW fluid discharges must meet the NPDES permits' allowable discharge requirements for produced water, BOEM has reasonably concluded that the effects from these discharges should be limited.

BOEM has reviewed the *Programmatic Environmental Assessment on the Use of Well Stimulation Treatments on the Pacific Outer Continental Shelf: Final Programmatic EA* (USDOI, BSEE and USDOI, BOEM, 2016). Well stimulation activities and potential impacts differ greatly between the Pacific and Gulf of Mexico OCS due to a variety of factors (e.g., different reservoir properties and different affected environment); therefore, BOEM has analyzed the use and potential impacts from these activities specifically for the Gulf of Mexico OCS in this Supplemental EIS. The primary drivers of offshore completions in the GOM are sand control and formation stimulation, with an extensive history of successful application.

CBD2-5 As described in this Supplemental EIS, the purpose of the proposed Federal action is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the OCSLA (67 Stat. 462) as amended (43 U.S.C §§ 1331 *et seq*.). The OCSLA provides the Congressional mandate for BOEM to make "available for expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs" the land of the Federal OCS. The decision to cancel a lease sale is under the authority of the Assistant Secretary for Land and Minerals Management.

CBD2-6 Comment noted.

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BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0009
Comment from John Harris , Colchester Creek

Submitter Information

Name: John Harris
Address:
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Organization: Colchester Creek

General Comment

Dear BOEM,

CC-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil

CC-1 and gas will deepen our climate crisis.

CC-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

CC-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

CC-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

CC-1 Comment noted.

CC-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and substitution effects.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Information about fracking can be found in Chapter 3.1.1.3 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 3.1.1.3** of this Supplemental EIS.

CC-3 Chapters 4.2.1.3 and 4.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS also discussed aging infrastructure, including both OCS Program and State oil and gas platforms and pipelines, and identified these types of infrastructure as a potential source of both inland and offshore spills. Spills are more likely to result from the older facilities, especially during storm conditions, because of the age of the pipeline or structure and the lack of newer superstructures designed to withstand major storms. To the extent that improperly abandoned and marked shallow-water wells exist in State waters, they may increase the potential for spills through vessel contact and leaks. The potential for onshore and nearshore spills may decrease as a result of more stringent regulations and new policies that call for increased enforcement to address properly plugging and dismantling abandoned wells.

CC-4 Information about the programmatic aspects of climate change relative to the environmental baseline for the Gulf of Mexico OCS Program can be found within each resource chapter found in Chapter 4.2, Appendix A.6, and Appendix G.3 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected sea-level rise and subsidence can be found in Chapter 3.3.4.1 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected impacts related to coastal erosion, subsidence, and coastal storms on low-income and minority communities can be found in Chapter 4.2.1.23.4 of the 2012-2017 WPA/CPA Multisale EIS.

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Comment from Mary Gutierrez, Earth Ethics, Inc.

Submitter Information

Name: Mary Gutierrez
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Organization: Earth Ethics, Inc.

General Comment

MG-1

I am writing to strongly encourage you to stop the sale central area lease 247.

We made a promise to our nation and the world in Paris last by

MG-1

agreeing to sign an agreement to address climate change.
The sell of leases and the continuous use of oil and gas is in direct contradiction of the steps we need to talk with regards to addressing climate change. We have a moral and ethical obligation to transition to clean, renewable energy sources. The time is now, we can no longer wait to do the right thing.

EEI-1 Comment noted.

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Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0025
Comment from John Wessel-McCoy, Kairos Center for Religions, Rights, and Social Justice

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Submitter Information

Name: John Wessel-McCoy
Address:
[redacted]
Email: [redacted]
Organization: Kairos Center for Religions, Rights, and Social Justice

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General Comment

Dear BOEM,

KC-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil

KC-1 and gas will deepen our climate crisis.

KC-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

KC-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

KC-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

Respectfully,

John Wessel-McCoy
Kairos Center for Religions, Rights, & Social Justice
[redacted]

KC-1 Comment noted.

KC-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Information about fracking can be found in Chapter 3.1.1.3 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 3.1.1.3** of this Supplemental EIS.

KC-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

KC-4 Refer to the response to comment CC-4.

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BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0002
Comment from Johnny Ardis, NA

Submitter Information

Name: Johnny Ardis
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

JA-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

JA-2

The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

JA-3

Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

JA-4

The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

JA-1 Comment noted.

JA-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Information about fracking can be found in Chapter 3.1.1.3 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 3.1.1.3** of this Supplemental EIS.

JA-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

JA-4 Refer to the response to comment CC-4.

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CPA247, BOEM <cpa247@boem.gov>

please cancel Lease Sale 247

1 message

Marta Badon [redacted] Mon, Apr 11, 2016 at 2:19 PM

MB-1 My family and I urge you to cancel Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis. The Bureau of Ocean Energy Management is proposing to offer 47.4 million acres for offshore oil and gas leasing in March 2017. Instead, the federal government urgently needs to end all new leases for fossil fuels on public lands and keep offshore oil and gas in the ground.

MB-2 The Bureau has the authority and duty to cancel this lease sale. The Outer Continental Shelf (OCS) Lands Act provides for the development of offshore oil and gas subject to environmental safeguards and consistent with national needs. 43 U.S.C. § 1332(3). The Act mandates that the management of the OCS consider "economic, social and environmental values" and specifically requires that oil and gas development be balanced "with protection of the human, marine, and coastal environments." Id. § 1802(2). Holding Lease Sale 247, which would lead to the development of new offshore oil and gas reserves, is wholly inconsistent with our nation's need to limit greenhouse gas emissions by keeping fossil fuels in the ground. The agency has authority to cancel this lease sale, 43 U.S.C. § 1331(e), as demonstrated by the Bureau's cancellation of two lease sales in the Arctic.

MB-3 The flawed draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking. These harmful effects of the lease sale must be fully disclosed and evaluated, and they counsel toward cancelling the sale.

MB-4 First, the greenhouse gas emissions resulting from the lease sale will impede the ability of the United States to meet international climate targets. Recently in Paris, the United States and other countries agreed to reduce greenhouse gas emissions. The Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels."

MB-5 The United States must leave the remaining OCS areas unleased for oil and gas development to ensure a reasonable probability of limiting warming to 1.5°C. To have even a 50% probability of achieving the Paris Agreement goal of limiting warming to 1.5°C above pre-industrial levels equates to a carbon budget of 550-600 GtCO2 from 2011 onward, of which more than 100 GtCO2 has already been emitted. The United States alone would use up the remaining carbon budget from federal and private fossil fuel reserves that are already leased.

MB-6 The draft supplement fails to evaluate the greenhouse gas consequences and social impact of the lease sale. The Gulf of Mexico and its people are at the front lines of climate change; tribes like Isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe. The draft supplement estimates the lease sale will produce 0.46-0.89 billion barrels of oil and 1.9-3.9 trillion cubic feet of natural gas, but it neither calculates the greenhouse gas pollution from using that oil and gas nor discusses the environmental consequences of those emissions.

MB-7 Second, offshore drilling is a dangerous and dirty industry with a history of accidents that have spilled oil in sensitive marine environments and taken lives. Hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering from the impacts of BP's

MB-7

2010 Deepwater Horizon oil spill. New scientific research documents severe lung disease, reproductive failure and mortality of oil-exposed dolphins; a "bathtub ring" of subsea oil; one million birds killed; sea turtles, marine mammals, and corals injured and killed; damaged wetlands; and corroded shipwrecks among other continuing harms. The draft supplement inadequately addresses the Gulf's degraded conditions and inevitable risk of oil spills resulting from the lease.

Oil spills have devastating impacts on human health and Gulf Coast economy. Key fishing areas have still not recovered from the Macondo well blowout. Further, leading companies cannot guarantee being able to stop a deepwater well blowout. There is little assurance in the ability of the technology to cap a blowout at 10,000 ft. or greater. The new capping technology is not designed for that depth and pressure according to a manufacturer and United States Coast Guard .

MB-8

Third, the draft supplement acknowledges that the lease will increase offshore fracking, but it ignores the environmental effects of this practice oil companies. Offshore hydraulic fracturing causes water and air pollution, and increases the risk of oil spills and earthquakes. Oil companies are allowed to dump their wastewater — including fracking chemicals — into the Gulf of Mexico, which may harm the Gulf's sensitive wildlife. Many fracking chemicals are known to be toxic to people and marine animals. For example, 40% of the chemicals added to fracking fluids have ecological effects, meaning they can harm aquatic and other wildlife. An analysis of the chemicals used during offshore fracking events in California between 2011 and 2013 found scientific studies indicating that many of the chemicals could kill or harm a broad variety of marine organisms, including sea otters, fish, and invertebrates. Numerous scientists and reports have linked fracking to water contamination, air contamination, spills, earthquakes and birth defects.

MB-9

Moreover, market conditions and preexisting leases support the cancellation of Lease Sale 247. Nearly 72% of offshore leases in the Gulf of Mexico are not under active exploration or development. This means that 26 million leased acres are already available for oil and gas production with18 billion barrels of oil and 50 trillion cubic feet of natural gas in the pipeline. Another lease sale is unnecessary given low oil prices, idle leases, and significant fossil fuels and greenhouse gases awaiting exploitation.

In conclusion, we urge you cancel Lease Sale 247 and select Alternative C the no action alternative. This will avoid the harmful effects of the lease sale to the Gulf of Mexico environment and the climate. It is the only action consistent with preserving our nation's ability to meet our obligations to reduce greenhouse gas levels and limit warming to 1.5°C.

Sincerely,
Bill Badon
Marta Badon
Joe Badon
Ben Badon
Gina Brown
Claire Bivins
Jessica Parets

MB-1 Comment noted.

MB-2 This Supplemental EIS is not a decision document. The Assistant Secretary for Land and Minerals Management will make a decision on the CPA proposed action. If the decision is to hold the proposed lease sale, it will be announced in the Final Notice of Sale and Record of Decision.

MB-3 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Information about fracking can be found in Chapter 3.1.1.3 of the 2012-2017 WPA/CPA Multisale EIS, WPA 233/CPA 231 Supplemental EIS, CPA 235/241/247 Supplemental EIS, and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 3.1.1.3** of this Supplemental EIS

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

MB-4 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

MB-5 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

MB-6 Refer to the response to comment CC-4.

MB-7 Refer to the response to comment CBD2-3 in regards to BOEM's use of recent studies and information related to *Deepwater Horizon* impacts to inform the analyses contained in this Supplemental EIS. Since the *Deepwater Horizon* explosion, oil spill, and response, BOEM and the BSEE have instituted a series of regulatory reforms responsive to recommendations regarding the *Deepwater Horizon* explosion, oil spill, and response. Refer to Chapter 1.3.1.2 of the 2012-2017 WPA/CPA Multisale EIS for information about regulatory reforms that have been instituted since the *Deepwater Horizon* explosion, oil spill, and response. Updates and additions to these reforms can be found in Chapter 1.3.2.2 of the WPA 233/CPA 231 Supplemental EIS and Chapter 1.3.1.1 of CPA 235/241/247 Supplemental EIS.

The BSEE published Drilling Safety Rules on August 22, 2012 (*Federal Register*, 2012b), and April 29, 2016 (*Federal Register*, 2016a). The 2012 Final Rule put forward certain recommended safety measures by incorporating the recommendations contained in DOI's report *Increased Safety Measures for Energy Development on the Outer Continental Shelf* (Safety Measures Report) (USDOI, 2010). The 2012 Final Rule also enhanced the description and classification of well-control barriers, defined testing requirements for cement, clarified requirements for the installation of dual mechanical barriers, and extended requirements for BOPs and well-control fluids to well completions, workovers, and decommissioning operations. The 2016 Final Rule closes gaps in existing requirements, addresses additional *Deepwater Horizon* recommendations, and updates the BSEE's regulations to reflect industry's best practices. The 2016 Final Rule is a comprehensive regulation addressing all dimensions of well control, including more stringent design

requirements and operational procedures for critical well-control equipment used in oil and gas operations on the United States' OCS.

Specifically, the 2016 Final Rule addresses the full range of systems and equipment related to well-control operations, with a focus on blowout preventer requirements, well design, well-control casing, cementing, real-time monitoring, and subsea containment. The measures are designed to improve equipment reliability, especially for blowout preventers and blowout prevention technologies. The 2016 Final Rule requires operability of equipment through rigorous testing and provides for the continuous oversight of operations. The regulations combine prescriptive and performance-based measures. Key features of the 2016 Final Rule include requirements for blowout preventer systems, double shear rams, third-party reviews of equipment, real-time monitoring data, safe drilling margins, centralizers, inspection intervals, and other reforms related to well design and control, casing, cementing, and subsea containment.

The 2012 Final Rule was based upon significant input received from various investigations and reports of the *Deepwater Horizon* explosion, oil spill, and response and include the Bureau of Ocean Energy Management, Regulation and Enforcement/U.S. Coast Guard's *Report Regarding the Causes of the April 20, 2010, Macondo Well Blowout* (USDOI, BOEMRE, 2011); *Macondo Well Deepwater Horizon Blowout: Lessons for Improving Offshore Drilling Safety* (Committee for Analysis of Causes of the *Deepwater Horizon* Explosion, Fire, and Oil Spill to Identify Measure to Prevent Similar Accidents to the Future et al., 2011); *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling; Report to the President* (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011); *Final Summary Report: April 2011-January 2013* (Ocean Energy Safety Advisory Committee, 2013); and extensive external consultation. Most of the 2016 Final Rule requirements do not become effective until 3 months after publication of the 2016 Final Rule, and several requirements have more extended timeframes for compliance.

MB-8 Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

MB-9 Comment noted.

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BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0026
Comment from Shailly Barnes, NA

Submitter Information

Name: Shailly Barnes
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

SHB-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

SHB-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

SHB-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

SHB-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

SHB-1 Comment noted.

SHB-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

SHB-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

SHB-4 Refer to the response to comment CC-4.

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BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0023
Comment from David Begley, NA

Submitter Information

Name: David Begley
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

DB-1

I am one hundred percent in favor of developing American oil and natural gas resources. If we drilled here, the United States could become an exporter of natural gas and stop importing foreign oil. We also would create wealth here.

DB-1 Comment noted.

CPA247, BOEM <cpa247@boem.gov>

"Comments on the Draft CPA 247 Supplemental EIS"

1 message

Scott Bryant [redacted] Mon, Apr 11, 2016 at 2:23 PM
To: cpa247@boem.gov

To BOEM Staff:

SB-1 Please cancel the March 2017 Central Planning Area lease auction! It is important for the entire spectrum of stakeholders that this CPA auction not occur.

Thank you for being the government of the People.
FS Bryant
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SB-1 Comment noted. This Supplemental EIS is not a decision document. The Assistant Secretary for Land and Minerals Management will make a decision on the CPA proposed action. If the decision is to hold the proposed lease sale, it will be announced in the Final Notice of Sale and Record of Decision.

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BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0032
Comment from Jeff Cobb, NA

Submitter Information

Name: Jeff Cobb
Address:
[redacted]
Email: [redacted]
Phone: [redacted]
Organization: NA

General Comment

JC-1 Climate change is not mentioned in your EIS. This is the greatest crisis in the history of humanity, and you have abrogated your responsibility so horribly, as to not even mention the only real issue of concern here. This is nothing short of criminal, not to mention morally and ethically

JC-1

bankrupt. Under the public trust doctrine, you have fiduciary responsibility to manage the climate in such a way that it will not be changed in a dangerous fashion to future generations. You will be held accountable by those of us choosing to stop your illegal, immoral and unethical breach of caring for the public trust to safely manage the climate of our planet.

April 11, 2016
Mr. Gary D. Goeke, Chief
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
Office of Environment (GM 623E)
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394
cpa247@boem.gov
Re: Draft Supplemental Environmental Impact Statement (EIS) for the proposed Gulf of Mexico Central Planning Area (CPA) Lease Sale 247 [BOEM-2015-0401]

JC-2

We - the Center for Biological Diversity, Gulf South Rising, Louisiana Bucket Brigade, Vanishing Earth, Rainforest Action Network, [and others] - urge you to cancel Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis. The Bureau of Ocean Energy Management is proposing to offer 47.4 million acres for offshore oil and gas leasing in March 2017. Instead, the federal government urgently needs to end all new leases for fossil fuels on public lands and keep offshore oil and gas in the ground.

JC-3

The Bureau has the authority and duty to cancel this lease sale. The Outer Continental Shelf (OCS) Lands Act provides for the development of offshore oil and gas subject to environmental safeguards and consistent with national needs. 43 U.S.C. 1332(3). The Act mandates that the management of the OCS consider "economic, social and environmental values" and specifically requires that oil and gas development be balanced "with protection of the human, marine, and coastal environments." Id. 1802(2). Holding Lease Sale 247, which would lead to the development of new offshore oil and gas reserves, is wholly inconsistent with our nation's need to limit greenhouse gas

JC-3 emissions by keeping fossil fuels in the ground. The agency has authority to cancel this lease sale, 43 U.S.C. 1331(e), as demonstrated by the Bureau's cancellation of two lease sales in the Arctic.

JC-4 The flawed draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking. These harmful effects of the lease sale must be fully disclosed and evaluated, and they counsel toward cancelling the sale.

JC-5 First, the greenhouse gas emissions resulting from the lease sale will impede the ability of the United States to meet international climate targets. Recently in Paris, the United States and other countries agreed to reduce greenhouse gas emissions. The Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature "to well below 2C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5C above pre-industrial levels."

JC-6 The United States must leave the remaining OCS areas unleased for oil and gas development to ensure a reasonable probability of limiting warming to 1.5C. To have even a 50% probability of achieving the Paris Agreement goal of limiting warming to 1.5C above pre-industrial levels equates to a carbon budget of 550-600 GtCO2 from 2011 onward, of which more than 100 GtCO2 has already been emitted. The United States alone would use up the remaining carbon budget from federal and private fossil fuel reserves that are already leased.

JC-7 The draft supplement fails to evaluate the greenhouse gas consequences and social impact of the lease sale. The Gulf of Mexico and its people are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe. The draft supplement estimates the lease sale will produce 0.46-0.89 billion barrels of oil and 1.9-3.9 trillion cubic feet of natural gas, but it neither calculates the greenhouse gas pollution from using that oil and gas nor discusses the environmental consequences of those emissions.

JC-8

In conclusion, we urge you cancel Lease Sale 247 and select Alternative C the no action alternative. This will avoid the harmful effects of the lease sale to the Gulf of Mexico environment and the climate. It is the only action consistent with preserving our nation's ability to meet our obligations to reduce greenhouse gas levels and limit warming to 1.5C.

JC-1 The 2012-2017 WPA/CPA Multisale EIS is the programmatic EIS that established the framework for subsequent environmental documents associated with the 2012-2017 Five-Year Program in the Gulf of Mexico. This and prior Supplemental EISs tier from and incorporate by reference information from the 2012-2017 WPA/CPA Multisale EIS and the other prior 2012-2017 Gulf of Mexico EISs; as such, information referenced in the prior 2012-2017 Gulf of Mexico EISs may not be found in every Supplemental EIS. This Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs. This Supplemental EIS should not be considered a stand-alone document.

Refer to the response to comment CC-4 for information about projected impacts related to coastal erosion, subsidence, and coastal storms on low-income and minority communities.

JC-2 Comment noted.

JC-3 This Supplemental EIS is not a decision document. The Assistant Secretary for Land and Minerals Management will make a decision on the CPA proposed action. If the decision is to hold the proposed lease sale, it will be announced in the Final Notice of Sale and Record of Decision.

JC-4 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

JC-5 Refer to the response to comment JC-4 for information on GHG emissions.

JC-6 Refer to the response to comment JC-4 for information on GHG emissions.

JC-7 Refer to the response to comment CC-4.

JC-8 Comment noted.

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BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0013
Comment from Andrew Collins, NA

Submitter Information

Name: Andrew Collins
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

AC-1

Don't lease the land. Climate change requires we not open more land for extracting fossil fuels.

ALC-1 Comment noted.

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Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0028
Comment from Alicia Cooke, NA

Submitter Information

Name: Alicia Cooke
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

ALC-1 Lease Sale 247 must be canceled. It is beyond disappointing that the Obama administration names climate change as a priority and then quietly places several million acres of the Gulf of Mexico up for auction with no acknowledgment of the discrepancy between policy action and

ALC-1

aims.

I have read your excellent Commenter's Checklist and I regret that my own comment doesn't fit much of the stated criteria, including citations, suggesting alternative plans of action etc. But for goodness sakes, I'm tired. I have a full-time job and devote as much spare time as I can to promoting events such as BOEM's lease sale and striving to mobilize my neighbors in Louisiana to engage. But they're tired, too. They also work hard. They simply don't have time to engage as thoroughly as is needed.

ALC-2

If you are reading this comment, I would bet that you know as clearly as I do that climate change poses a clear and present threat to human existence. A third of oil reserves and 80% of fossil fuel reserves overall must be left in the ground in order to avoid catastrophic post-Industrial age warming above 2 degrees Celsius (http://www.nature.com/nature/journal/v517/n7533/full/nature14016.html). This is the only factor you need to consider when moving forward with Lease Sale 247 and future sales.

You can't move forward.

Despite your helpful commenting tips, it is not the job of the public to thoroughly read or understand this EIS and suggest alternative plans of action. There's no time and it's not our expertise. Your responsibility is to the public, not the other way around. I appreciate the opportunity to make public comment, but I fear the inevitable lack of response you receive when the public can't find the relevant documents/ has not been properly informed of the relevant documents/ cannot understand the relevant documents serves to provide cover to BOEM when they wish to blame public apathy for their decision to hand public lands and waters over to the fossil fuel industry for exploitation.

Cancel this sale and all future sales.

ALC-1 Comment noted.

ALC-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

PUBLIC SUBMISSION

As of: 4/11/16 4:24 PM
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Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0030
Comment from Jennifer Crosslin, NA

Submitter Information

Name: Jennifer Crosslin
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

JEC-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

JEC-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

JEC-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

JEC-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

Sincerely,

Jennifer Crosslin

JEC-1 Comment noted.

JEC-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

JEC-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

JEC-4 Refer to the response to comment CC-4.

PUBLIC SUBMISSION

As of: 4/11/16 11:55 AM
Received: April 08, 2016
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Tracking No. 1k0-8oyn-nixz
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Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0011
Comment from Mary DiFelici, NA

Submitter Information

Name: Mary DiFelici
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

MD-1 Please do not lease any new drilling areas in the Gulf! Thank you for your consideration.

MD-1 Comment noted.

PUBLIC SUBMISSION

As of: 4/11/16 11:57 AM
Received: April 09, 2016
Status: Pending_Post
Tracking No. 1k0-8oz3-bx5d
Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0017
Comment from Carmen Druke, NA

Submitter Information

Name: Carmen Druke
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

CD-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

CD-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

CD-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

CD-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

CD-1 Comment noted.

CD-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and the treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

CD-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

CD-4 Refer to the response to comment CC-4.

PUBLIC SUBMISSION

As of: 4/11/16 11:52 AM
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Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0005
Comment from Connie Eisele, NA

Submitter Information

Name: Connie Eisele
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

CE-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

CE-2

The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

CE-3

Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

CE-4

The draft supplement also appears to fail to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

CE-1 Comment noted.

CE-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

CE-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

CE-4 Refer to the response to comment CC-4.

PUBLIC SUBMISSION

As of: 4/11/16 12:02 PM
Received: April 11, 2016
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Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0029
Comment from Y Ferg, NA

Submitter Information

Name: Y Ferg
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

I also dont like you require all personal imformation only be told you wont listen to our voice unless you are given it then we also informed anyone could acesss to it ..I find this unfear safety risk burden brought on us by you. To be able to acess our so called freedom
I am untied states citizen I fear a repeat of deep water horizon where as

YF-1

YF-1

private citizen we as untied states citizen were toxic chemical poisoned we where not give all the true facts and as this what I feel we didnot get our due justice under the law as to our injuries our local,federal ,states the goverment intenty where given more monies and respect that normal citizen and as citizen we told go thur settlement claim process that deny everyone for this I fear more drilling mean more chances for another DWH chance to have another spill like DWH then I fear our govermental will allow them to help them to spray this toxic dispersant on us I feel instead of sale of more land make oil companies require them go back check all old wells and tap them for there resources as I don't want tap them either feel we have enough will already .but understand that going to do allow them.do something but it greed factor ...money ,money ,I fear human lives dont count sure didnot DWH ..BP not even foot note ... BP A MAJOR mutli national corp ..our goverment allow to come in spray ,pump well head ,flying our in air force plane on people blow them in there boat ,all time being told it safe dont worry about it untied stayes gov allow BP MUTINATIONAL.CORP TO POSION PRIVATE UNTIED STATES CITIZENS ..and posion us without even envormental impact studies or anything health empact studies goverment should spend more time find way to how to protect us from ever a repeat DWH .I don't think realize how there choice and decision effect the normal everyday lives of normal law bidding citizen I thibk some comes over to bussiness they should be required to follow the law and guidelines same as anyone else there should be required to face same conquences as we as untied states citizen are how about for change why not pay attention to people and envormental conconsences instead of the dollar..honest think this gonna happen no way do wish would yes ..This following reason why I feel that this time it wrong I think It should said NO !NO !

UNTIL YOU CAN FIND AWAY GUARANTEE A WAY TO PROTECT YOUR UNTIED STATES CITIZEN AND EVIROMENTAL HAZARD ...

There are alot of tap wheel.some from 50 year or more that have just been tap plug and left why not make them go check them and tap them require them to protect us and eviroment .. You should rethink what more important.

I don't want anyone to ever again experience horror of TOXIC CHEMICALS POISONING AT HAND OF ANOTHER CORP MULTI NATIONAL OTHER WISE ...

YF-1 Refer to the response to comment CBD2-3 in regards to BOEM's use of recent studies and information related to *Deepwater Horizon* impacts to inform the analyses contained in this Supplemental EIS. Since the *Deepwater Horizon* explosion, oil spill, and response, BOEM and the BSEE have instituted a series of regulatory reforms responsive to recommendations regarding the *Deepwater Horizon* explosion, oil spill, and response. Refer to Chapter 1.3.1.2 of the 2012-2017 WPA/CPA Multisale EIS for information about regulatory reforms that have been instituted since the *Deepwater Horizon* explosion, oil spill, and response. Updates and additions to these reforms can be found in Chapter 1.3.2.2 of the WPA 233/CPA 231 Supplemental EIS and Chapter 1.3.1.1 of CPA 235/241/247 Supplemental EIS.

Refer to the response to comment MB-7 for information on Drilling Safety Rules published by the BSEE. The 2012 Final Rule put forward certain recommended safety measures by incorporating the recommendations contained in DOI's report *Increased Safety Measures for Energy Development on the Outer Continental Shelf* (Safety Measures Report) (USDOI, 2010). The 2016 Final Rule closes gaps in existing requirements, addresses additional *Deepwater Horizon* recommendations, and updates the BSEE's regulations to reflect industry's best practices. The 2016 Final Rule is a comprehensive regulation addressing all dimensions of well control, including more stringent design requirements and operational procedures for critical well-control equipment used in oil and gas operations on the United States' OCS.

PUBLIC SUBMISSION

As of: 4/11/16 11:56 AM
Received: April 09, 2016
Status: Pending_Post
Tracking No. 1k0-8oz1-wkh4
Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0015
Comment from Elliot Figman, NA

Submitter Information

Name: Elliot Figman
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

EF-1 I am writing to ask that you cancel Central Planning Area Lease Sale 247. It's been six years since the horrific Deepwater Horizon spill and wildlife in the Gulf of Mexico has still not recovered. Also, the draft

EF-1 supplemental environmental impact statement is inadequate. It fails to fully reveal the impacts of the lease sale on oil spills and offshore fracking, not to mention climate change. The sale would also harm communities most impacted by climate change, including the Choctaw tribe.

EF-2 I call on you to cancel the lease sale, for the good of humanity.

Sincerely,

Elliot Figman

EF-1 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

EF-2 Comment noted.

PUBLIC SUBMISSION

As of: 4/11/16 11:52 AM
Received: April 08, 2016
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Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0004
Comment from John Foisy, NA

Submitter Information

Name: John Foisy
Address:
[redacted]
Email: [redacted]
Phone: [redacted]
Organization: NA

General Comment

JF-1 Don't lease new drilling in the Gulf of Mexico! Bad idea for the US and the planet.

JF-1 Comment noted.

PUBLIC SUBMISSION

As of: 4/11/16 11:53 AM
Received: April 08, 2016
Status: Pending_Post
Tracking No. 1k0-8oyk-pzau
Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0007
Comment from Renuka Gogu, NA

Submitter Information

Name: Renuka Gogu
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

RG-1

I am writing to you with an urgent request: Please CANCEL Central

RG-1 Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

RG-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

RG-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

RG-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247

RG-1 Comment noted.

RG-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

RG-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

RG-4 Refer to the response to comment CC-4.

PUBLIC SUBMISSION

As of: 4/11/16 11:53 AM
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Tracking No. 1k0-8oyk-tyvm
Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0006
Comment from Renate Heurich , NA

Submitter Information

Name: Renate Heurich
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

RH-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil

RII-1 and gas will deepen our climate crisis.

RII-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

RII-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

RII-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like Isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe. New Orleans, my home city, is threatened by stronger hurricanes and is facing extinction with rising sea levels due to climate change. It is urgent that we rapidly move from burning fossil fuels to a renewable energy infrastructure.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

RH-1 Comment noted.

RH-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

RH-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

RH-4 Refer to the response to comment CC-4.

PUBLIC SUBMISSION

As of: 4/11/16 11:56 AM
Received: April 08, 2016
Status: Pending_Post
Tracking No. 1k0-8oyr-jlfd
Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0014
Comment from Terri Holley , NA

Submitter Information

Name: Terri Holley
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

I am writing as an environmentally conscious citizen to ask that you immediately halt the Central Planning Area Lease Sale 247.

TH-1 I am positive that as our Bureau of Ocean Energy Management, you are fully aware of the inefficiencies in the environmental impact study

TH-1

that fail to address many of the possible damaging effects that could occur and ignore the potential economic and social impact to the region.

What you should also consider is that the American people are increasingly aware that continuing to rely on dangerous and harmful extraction of fossil fuels from our environment when the remainder of the world is evolving toward cleaner, safer and more cost efficient sources of energy is highly suspect.

In fact, the people can only conclude that this sale and the continuation of such processes that have caused so much harm and destruction to our lands, wildlife, waters, people and economy can only be to profit not the American people but the corporate interests exerting undue influence within our government.

The BOEM and other government agencies belong to the people of America and all of our government officials should be on notice that the American people are paying very close attention to the decisions made on our behalf.

TH-1 Comment noted.

PUBLIC SUBMISSION

As of: 4/11/16 11:53 AM
Received: April 08, 2016
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Tracking No. 1k0-8oyk-w22r
Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0008
Comment from Charon Hribar, NA

Submitter Information

Name: Charon Hribar
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

CH-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil

CH-1 and gas will harm local communities and deepen our climate crisis.

CH-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

I was recently in Louisiana visiting with communities who have been directly impacted by the Deepwater Horizon spill. People whose livelihood depended on fishing, have not been able to make ends meet because key fishing grounds have still not recovered.

CH-3 The industry is making plans to launch new drilling sits, while refusing to deal with aging infrastructure of offshore rigs and ignoring the risk of future oil spills as a result.

CH-4 Alternative energy forms now exist. There is no reason for communities living in the Gulf of Mexico to be put in harms way or told they need to move so that oil drilling can continue to expand. We need to live into the future and no longer refuse to recognize the impact fossil fuel extraction is having on our people and our planet.

The Gulf is not a sacrifice zone. People must come before profits!

Stop new offshore drilling and cancel the Lease Sale 247.

Sincerely,
Charon Hribar

CH-1 Comment noted.

CH-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

CH-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

CH-4 Refer to the response to comment CC-4.

PUBLIC SUBMISSION

As of: 4/11/16 11:56 AM
Received: April 09, 2016
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Tracking No. 1k0-8oz2-3v7a
Comments Due: April 11, 2016
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Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0016
Comment from Daniel Jones, NA

Submitter Information

Name: Daniel Jones
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

DJ-1 I strongly urge you to CANCEL Central Planning Area Lease Sale 247. There is no justification for opening up more of the Gulf to oil and gas drilling, considering the climate crisis we're already facing, and the

DJ-1

disastrous effects that drilling has had on communities along the Gulf Coast. People still haven't recovered from the Deep Water Horizon disaster. It's time to move away from fossil fuels, and away from industries that poison and degrade our communities.

The environment impact statement doesn't come close to describing the full range and depths of the effects that drilling have had and will continue to have on the people who live closest to them. Please, do not go ahead with this sale. It isn't worth it.

Many times, government officials and the companies claim that expanding offshore drilling is about "jobs", but there's so much work that could be done fixing the mess the industry has already made, and even repairing the dangerous and aging infrastructure for the industry in the region, it doesn't make sense to just expand drilling. Unless, of course, "jobs" is a code-word for "profits" for the drilling and oil companies. If that's the case, come out and say it directly! If this is about jobs, let's figure out how to put people to work repairing and healing their communities, instead of leaving them with no options but to participate in ecological destruction, and to put their own lives at risk. There are other options.

DJ-1 Comment noted.

PUBLIC SUBMISSION

As of: 4/11/16 11:46 AM
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Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0001
Comment from Blake Kopcho, NA

Submitter Information

Name: Blake Kopcho
Address:
[redacted]
Email: [redacted]
Phone: [redacted]
Organization: NA

General Comment

Dear BOEM,

BK-1

I am writing to you with an urgent request: Please CANCEL Central

BK-1 Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

BK-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

BK-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

BK-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

BK-1 Comment noted.

BK-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

BK-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

BK-4 Refer to the response to comment CC-4.

CPA247, BOEM <cpa247@boem.gov>

Comments on the Draft CPA 247 Supplemental EIS

1 message

Jack Neff [redacted] Mon, Apr 11, 2016 at 11:59 PM
Reply-To: [redacted]
To: "cpa247@boem.gov" <cpa247@boem.gov>

JN-1

Request for Comments on the Draft CPA 247 Supplemental EIS went out on February 26, 2016 and timely submit as relevant these comments on how the Draft CPA 247 Supplemental EIS is entirely characteristic of projects promoted by BOEM in execution of a policy which has never changed. The enraged citizenry of New Orleans and all the surrounding Parishes should descend upon Central Planning Area 247 Draft EIS New Orleans Meeting demanding a revocation of Royalty Relief for criminal polluters, and show that BOEM designed policies, reviews, shoddy, corrupt processing of requests for royalty rate reductions is approximately equal to BOEM as it generates economic assumptions about subjects it knows nothing about, namely stopping the environmental holocaust of energy development in the Gulf, without regard for life or geologic integrity. Now stop these 2017 leases because if you don't, your rigs wont pass muster with Risk Management no more and your [redacted] will drop to zero.

Jack Neff
[redacted]

JN-1 Comment noted.

PUBLIC SUBMISSION

As of: 4/11/16 11:54 AM
Received: April 08, 2016
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Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0010
Comment from Mary Nicol, NA

Submitter Information

Name: Mary Nicol
Address:
[redacted]
Email: [redacted]
Phone: [redacted]
Organization: NA

General Comment

Dear BOEM,

MN-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil

MN-1 and gas will deepen our climate crisis.

MN-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

MN-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

MN-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

Please - for our future, and our children's future.

MN-1 Comment noted.

MN-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

MN-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

MN-4 Refer to the response to comment CC-4.

CPA247, BOEM <cpa247@boem.gov>

Draft Supplemental Environmental Impact Statement for proposed Central Planning Area Lease Sale 247

1 message

Benjamin Craft-Rendon [redacted] Mon, Apr 11, 2016 at 11:53 AM
To: cpa247@boem.gov

I find it astounding that BOEM is considering withholding leases in ecologically significant areas rather than already doing so as a practice. To treat the entire Gulf of Mexico as first and foremost an industrial zone is a morally corrupt, tragic, and deadly mode of operation.

3,400 offshore rigs is plenty enough to manage and maintain at a time when the fossil fuel industry -- including companies holding your leases -- owe their workers $40 million dollars in back-wages:http://www.usnews.com/.../oil-and-gas-companies-stiff-29-000-...

BCR-1

The current financial situation of the fossil fuel industry is likely to stimulate increased risks from corporate corruption: cutting corners in worker training and safety and in code compliance. Stop enabling another Deepwater Horizon disaster. People are sick and will be sick for the rest of their lives because of what happened six years ago. People are dead and dying early because of what happened six years ago.

The world is changing and your auctioning process is short-sighted, behind the times, heading the wrong way. You're putting the rights for using the Gulf of Mexico into the wrong hands. Stop your auction process.

Benjamin Craft-Rendon
"Safe upon the solid rock the ugly houses stand: Come and see my shining palace built upon the sand!" ~Edna St. Vincent Millay

BCR-1 Refer to the response to comment MB-7.

PUBLIC SUBMISSION

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Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0018
Comment from Michael Rimes, NA

Submitter Information

Name: Michael Rimes
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

MR-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

MR-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

MR-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

MR-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

MR-1 Comment noted.

MR-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

MR-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

MR-4 Refer to the response to comment CC-4.

4/26/2016 DEPARTMENT OF THE INTERIOR Mail - Gulf of Mexico Oil Leases

CPA247, BOEM <cpa247@boem.gov>

Gulf of Mexico Oil Leases

1 message

Cynthia Scott [redacted] Mon, Apr 11, 2016 at 10:55 AM
Reply-To: [redacted]
To: "cpa247@boem.gov" <cpa247@boem.gov>

Dear Sirs:

CS-1 The current financial situation of the fossil fuel industry is likely to stimulate increased risks from corporate corruption: cutting corners in worker training and safety and in code compliance. Stop enabling another Deepwater Horizon disaster. People are sick and will be sick for the rest of their lives because of what happened six years ago. People are dead and dying early because of what happened six years ago.

CS-2 It's imperative that you choose Option C: NO NEW LEASES -- STOP THE AUCTIONS.

CS-3 What I see missing is any assessment of:
[1] how the fossil fuels extracted from the Gulf of Mexico contribute to greenhouse gas global warming phenomena
[2] how the fossil fuels extracted from the Gulf of Mexico have environmental impacts on communities fence line to refineries
[3] how scientific predictions of increased weather intensity due to climate change is going to impact the risk and rate of damages to offshore infrastructure.

Please STOP HAVING LEASE AUCTIONS while you develop the process to add these components of analysis to your environmental impact assessments.

Sincerely,

Cynthia Scott
[redacted]

https://mail.google.com/mail/b/291/u0/?ui=2&ik=fdce64da748&view=pt&search=inbox&th=1540609964fcb7c6&siml=1540609964fcb7c6 1/1

CS-1 Refer to the response to comment MB-7.

CS-2 Comment noted.

CS-3 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

Information about the programmatic aspects of climate change relative to the environmental baseline for the Gulf of Mexico OCS Program can be found within each resource chapter found in Chapter 4.2, Appendix A.6, and Appendix G.3 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected impacts related to coastal erosion, subsidence, and coastal storms on low-income and minority communities can be found in Chapter 4.2.1.23.4 of the 2012-2017 WPA/CPA Multisale EIS.

Chapter 4.2.1.23.1 ("Land Use and Coastal Infrastructure") of the 2012-2017 WPA/CPA Multisale EIS discusses the current status of oil and gas infrastructure. The OCS oil- and gas-related infrastructure, a long-standing part of these regional economies that developed over the past several decades, is quite mature. The CPA proposed action would not require additional coastal infrastructure, with the possible exception of 0-1 new gas processing facility and 0-1 new pipeline landfall, and it would not alter the current land use of the analysis area.

The 2012-2017 WPA/CPA Multisale EIS also discusses the predictions of increased weather intensity, including hurricane intensity and the link between hurricanes and damage to offshore infrastructure and pipelines. A discussion of predicted changes in hurricane intensity can be found in Appendix A of the 2012-2017 WPA/CPA Multisale EIS. Appendix A provides information about projected global climate change conclusions of the Intergovernmental Panel on Climate Change (2007).

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Comments Due: April 11, 2016
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Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0024
Comment from Terra Shute, NA

Submitter Information

Name: Terra Shute
Address:
[redacted]
Email: [redacted]
Phone: [redacted]
Organization: NA

General Comment

Dear BOEM,

TS-1 Please stop destroying land that doesn't belong to you. As an Indian and person of color, I believe these actions are simply the latest in the

TS-1 chain of broken treaties. I implore you to consider the effects of these actions. I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

TS-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

TS-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

TS-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247. Please start looking of the impact of these actions on the next seven generations. May you be blessed.

TS-1 Comment noted.

TS-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

TS-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

TS-4 Refer to the response to comment CC-4.

PUBLIC SUBMISSION

As of: 4/11/16 4:26 PM
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Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0031
Comment from Ramsey Sprague, NA

Submitter Information

Name: Ramsey Sprague
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

RS-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

RS-2 The draft supplement fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change. My relatives living on Isle de Jean Charles are Biloxi-Chitimacha Confederation of Muskogee. My tribe is the first body to receive federal assistance for having lost our ancestral lands to the sea. The sale of these leases will only exacerbate an impending social and economic catastrophes for other, similarly situated coastal communities.

RS-3 Clearly, the draft SEIS fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

RS-4 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered, and those fishing communities are devastated in ways that are indescribable in a simple letter.

RS-5 The draft SEIS inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. The legacies of environmental racism in the Gulf are clearly visible when looking at who lives along the fencelines of petrochemical infrastructure in Texas, Louisiana, Mississippi, Alabama, and Florida.

It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

We can and must make do with the leases already sold and prepare our peoples and economies for a just transition to an energy future that recognizes and is responsive to the imperative of public health and

safety as its prime concern - not its initial rate of return.

RS-1 Comment noted.

RS-2 The 2012-2017 WPA/CPA Multisale EIS is the programmatic EIS that established the framework for subsequent environmental documents associated with the 2012-2017 Five-Year Program in the Gulf of Mexico. This and prior Supplemental EISs tier from and incorporate by reference information from the 2012-2017 WPA/CPA Multisale EIS and the other prior 2012-2017 Gulf of Mexico EISs; as such, information referenced in the prior 2012-2017 Gulf of Mexico EISs may not be found in each and every Supplemental EIS. This Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs. This Supplemental EIS should not be considered a stand-alone document.

Information about the programmatic aspects of climate change relative to the environmental baseline for the Gulf of Mexico OCS Program can be found within each resource chapter found in Chapter 4.2, Appendix A.6, and Appendix G.3 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected sea-level rise and subsidence can be found in Chapter 3.3.4.1 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected impacts related to coastal erosion, subsidence, and coastal storms on low-income and minority communities can be found in Chapter 4.2.1.23.4 of the 2012-2017 WPA/CPA Multisale EIS.

RS-3 As stated in the response to comment RS-2, this Supplemental EIS updates the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the CPA since publication of the prior 2012-2017 Gulf of Mexico EISs and should not be considered a stand-alone document. Included below are references to prior 2012-2017 Gulf of Mexico EISs that provide more detailed information about GHG emissions, accidental events including oil spills, and information about fracking.

Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

RS-4 Comment noted.

RS-5 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

CPA247, BOEM <cpa247@boem.gov>

Comments on the Draft CPA 247 Supplemental EIS

1 message

Aly Tharp [redacted] Mon, Apr 11, 2016 at 10:19 AM
To: cpa247@boem.gov

That BOEM is considering withholding leases in ecologically significant areas, rather than already doing so as a practice, astounds me.To treat the entire Gulf of Mexico as first and foremost an industrial zone is a morally corrupt, tragic, and deadly mode of operation.

3,400 offshore rigs is plenty enough to manage and maintain at a time when the fossil fuel industry -- including companies holding your leases -- owe their workers $40 million dollars in back-wages: http://www.usnews.com/news/articles/2016-04-04/oil-and-gas-companies-stiff-29-000-workers-out-of-40-million

AT-1 The current financial situation of the fossil fuel industry is likely to stimulate increased risks from corporate corruption: cutting corners in worker training and safety and in code compliance. Stop enabling another Deepwater Horizon disaster. People are sick and will be sick for the rest of their lives because of what happened six years ago. People are dead and dying early because of what happened six years ago.

AT-2 The world is changing and your auctioning process is short-sighted, behind the times, heading the wrong way. You're putting the rights for using the Gulf of Mexico into the wrong hands. **Stop your auction process.**

What I know of your EIS for lease sale 247, I learned from this video / presentation by Beth Nord published on your website: http://www.boem.gov/Central-Planning-Area-247-Draft-EIS-New-Orleans-Meeting/

AT-3 It's imperative that you choose Option C: NO NEW LEASES -- STOP THE AUCTIONS.

AT-4 What I see missing is any assessment of:
[1] how the fossil fuels extracted from the Gulf of Mexico contribute to greenhouse gas global warming phenomena
[2] how the fossil fuels extracted from the Gulf of Mexico have environmental impacts on communities fence line to refineries
[3] how scientific predictions of increased weather intensity due to climate change is going to impact the risk and rate of damages to offshore infrastructure.

Please STOP HAVING LEASE AUCTIONS while you develop the process to add these components of analysis to your environmental impact assessments.

Sincerely,
Alyssa Tharp

AT-1 Since the *Deepwater Horizon* explosion, oil spill, and response, BOEM and the BSEE have instituted a series of regulatory reforms responsive to recommendations regarding the *Deepwater Horizon* explosion, oil spill, and response. Refer to Chapter 1.3.1.2 of the 2012-2017 WPA/CPA Multisale EIS for information about regulatory reforms that has been instituted since the *Deepwater Horizon* explosion, oil spill, and response. Updates and additions to these reforms can be found in Chapter 1.3.2.2 of the WPA 233/CPA 231 Supplemental EIS and Chapter 1.3.1.1 of CPA 235/241/247 Supplemental EIS.

Most recently, the BSEE published Drilling Safety Rules on August 22, 2012 (*Federal Register*, 2012b) and April 29, 2016 (*Federal Register*, 2016a). Refer to the response to comment MB-7 for more information on the Drilling Safety Rules.

AT-2 The OCSLA (43 U.S.C § 1332(3)) was passed in 1953 and was amended in 1978 by Congress. The Congressional mandate gives the Federal Government the authority to offer leases on the OCS for expeditious and orderly development, subject to environmental safeguards, in a manner that is consistent with the maintenance of competition and other national needs.

AT-3 Comment noted.

AT-4 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions. Information about the programmatic aspects of climate change relative to the environmental baseline for the Gulf of Mexico OCS Program can be found within each resource chapter found in Chapter 4.2, Appendix A.6, and Appendix G.3 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected impacts related to coastal erosion, subsidence, and coastal storms on low-income and minority communities can be found in Chapter 4.2.1.23.4 of the 2012-2017 WPA/CPA Multisale EIS.

Chapter 4.2.1.23.1 ("Land Use and Coastal Infrastructure") of the 2012-2017 WPA/CPA Multisale EIS discusses the current status of oil and gas infrastructure. The OCS oil- and gas-related infrastructure, a long-standing part of these regional economies that developed over the past several decades, is quite mature. The CPA proposed action would not require additional coastal infrastructure, with the possible exception of 0-1 new gas processing facility and 0-1 new pipeline landfall, and it would not alter the current land use of the analysis area.

The 2012-2017 WPA/CPA Multisale EIS also discusses the predictions of increased weather intensity, including hurricane intensity and the link between hurricanes and damage to offshore infrastructure and pipelines. A discussion of predicted changes in hurricane intensity can be found in Appendix A of the 2012-2017 WPA/CPA Multisale EIS. Appendix A provides information about projected global climate change conclusions of the Intergovernmental Panel on Climate Change (2007).

PUBLIC SUBMISSION

As of: 4/11/16 12:01 PM
Received: April 10, 2016
Status: Pending_Post
Tracking No. 1k0-8p03-u3cv
Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0027
Comment from Margie Vicknair-Pray, NA

Submitter Information

Name: Margie Vicknair-Pray
Address:
[redacted]
Email: [redacted]
Phone: [redacted]
Organization: NA

General Comment

MVP-1

I urge you to cancel Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis, and has the potential to destroy even further, the Gulf Coast and the coastal marshes and wetlands that nurture so much of our wildlife and seafood.

MVP-1

Additionally, the pollution of our waters is unforgivable and should be stopped immediately.

MVP-2

You are proposing to offer 47.4 million acres for offshore oil and gas leasing in March 2017. Instead, the Federal government urgently needs to end all new leases for fossil fuels on public lands and keep offshore oil and gas in the ground. We are destroying our future so that a handful of people can add more billions to their offshore accounts. This is not serving the citizens of the United States, or preserving "the human, marine, and coastal environments," as you are mandated to do. You are to consider "economic, social and environmental values." If that is truly done, the lease sales should be cancelled, as it is in your authority to do. The development of new offshore oil and gas reserves is wholly inconsistent with our nation's need to limit greenhouse gas emissions by keeping fossil fuels in the ground.

MVP-3

The flawed draft supplemental Environmental Impact Statement fails to fully disclose the real impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, fires and explosions from daily operations, and (3) long term offshore pipeline and platform leakages, such as the ongoing Taylor lease leak. These harmful effects of the lease sale must be fully disclosed and evaluated, and they counsel toward cancelling the sale.

Please consider the future. Consider the children. Consider that we do not know how badly we have already harmed the Earth, or whether it is already too late to preserve a planet that can support life as we know it. Someone has to have the sense to see the need to stop the madness that is oil and gas development, and to ignore the greed that has brought us to this point.

MVP-1 Comment noted.

MVP-2 The oil and gas resources on the OCS belong to the people of the United States, who, through their Government, lease the right to explore and develop those resources. The Federal Government, through BOEM and the BSEE, issues permits for prelease exploration activities, independently evaluates oil and gas resources and reserves, leases acreage, performs environmental assessments, and regulates drilling and production activities. The OCSLA, which was passed by Congress in 1953 and amended in 1978, is the basis for many of the procedures and activities carried out by BOEM and the BSEE. The OCSLA provides the Congressional mandate for BOEM to make "available for expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs" the lands of the Federal OCS. The decision to cancel a lease sale is under the authority of the Assistant Secretary for Land and Minerals Management.

MVP-3 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

The BSEE's oil-spill database (USDOI, BSEE, 2015a) was reviewed to assess new spill information to provide an update to the Anderson et al. (2012) analysis. The database includes annual reporting of accidental spills, including the Taylor Energy spill referenced in the comment. These data were used in the **Chapter 3** analysis of potential spills based on historical data (**Chapter 3.2.1.2**), which BOEM's subject-matter experts used in their resource analyses. The BSEE and BOEM have worked with the U.S. Coast Guard under a Unified Command to monitor and respond to discharges from Taylor Energy's Mississippi Canyon Block 20 site since the oil production platform and 25 of the 28 connected wells were impacted and damaged during Hurricane Ivan in 2004. The multi-agency effort has worked continuously to prevent and control the oil discharge, improve the effectiveness of containment around the source of the oil discharge, and mitigate environmental impacts. The Unified Command's collaborative efforts have resulted in the removal of the platform deck, removal of subsea debris, decommissioning of the oil pipeline, and intervention of 9 of the 25 impacted wells. Taylor Energy, as the responsible party, has a continuing legal obligation and responsibility to pay for oil-spill recovery and response costs under the Oil Pollution Act of 1990.

CPA247, BOEM <cpa247@boem.gov>

4:BOEM4NOLA:NO NEW LEASES - STOP THE AUCTIONS!

1 message

Heidi Vierthaler [redacted] Mon, Apr 11, 2016 at 1:58 PM
To: "cpa247@boem.gov" <cpa247@boem.gov>

HV-1

I am copying and pasting my and Aly Tharp's Facebook post because I feel I'm running out of time, and I trust her perspective, to urge you to know that it is It's imperative that you choose Option C: NO NEW LEASES -- STOP THE AUCTIONS!

Please RSVP to me.

Thank you for your time and consideration.

Heidi J Vierthaler

[redacted]

Unless urgent, I prefer calls after 2PM, thanks!

My Posts in response to the event **6 Years Later – Rising Up from the Spill**:

April 9 at 9:02am AWESOME, thank you so much, especially Riki Ott Cherri Foytlin, Kindra Arnesen, Wilma Subra, and Emily Harris as well as everyone else involved in this endeavor, for shining such a light on such enormously important subject! Who else will be speaking (I hope you will Emily)? I am so grateful this will be livestreamed so that the nation and the world will be able to learn about the tragedy of this man made oil rig volcano that I am sure is still unfolding while most on Earth are ignoring and or are oblivious to it, as other stories take precedence in the news cycles, and that we all will have the chance to participate in this crucial discussion. Please answer: which livestream platform/service will you be using, I need to be sure my computer will be ready! Also will there be a way that we could send pre-recorded videos of our questions? Thank you! I wish Facebook didn't have such an archaic 500 Friends invite limit as I'd invite at least 95% of my nearly 1,200 friends to this as EVERYONE MUST see this as a cautionary tale with all of the drilling that is still allowed to continue! We thus need to urgently work to transition Our World, especially including employing all of those working in the fossil fuel industry, to a New Green Energy Economy!

Please watch the movie trailer for:

Www.therisingfilm.tv ;

April 9 at 2:00pm: OMG! This gave me the chills and made the hair on the back of my neck stand up straight! Within months of the disaster (not a spill) I tried in vain to get my Congresspeople Chellie Pingree (Willy Ritch) here in Maine, and former Waltham, MA Representative Edward Markey to hold Congressional hearings with just the kinds of people in this movie, especiallyKindra Arnesen, Cherri Foytlin, Emily Harris, Paul Matthew Doom,C.j. SeafoodWilma Subra, etc., to blow the lid off of the secrecy of the full extent of the disaster to befall the people of the Gulf Coast of Mexico in the wake of the BP man-made Deepwater Horizon Rig Oil Volcano and the toxic aftermath of the Corexit dispersant spraying, because I wanted the world to know the pain that had been inflected on my new Facebook Friends and their Communities dealing with this in the Gulf and I didn't want anyone else to suffer a similar fate because no one did anything about it; and this trailer nails it! I can't wait to see the movie! Any chance we can bring the film and some of the participants to Maine, and have a traveling roadshow to tour Our Nation and Our Earth? Thank you to everyone who is working on this crucially important endeavor!

Aly Tharp's Facebook post:

HERE is a letter that organizations in opposition to these lease sales can sign on to: https://docs.google.com/.../1LuPBCupS4ryXqH2B_h-9Q3B.../viewform
(follow the link to the PDF of the letter for some good information and language that you can adapt and add to your own statement)

Here is what I wrote to BOEM (you are welcome to adapt and add to my language as well):
That BOEM is considering withholding leases in ecologically significant areas, rather than already doing so as a practice, astounds me.To treat the entire Gulf of Mexico as first and foremost an industrial zone is a morally corrupt, tragic, and deadly mode of operation.

3,400 offshore rigs is plenty enough to manage and maintain at a time when the fossil fuel industry -- including companies holding your leases -- owe their workers $40 million dollars in back-wages: http://www.usnews.com/.../oil-and-gas-companies-stiff-29-000-...

HV-2

The current financial situation of the fossil fuel industry is likely to stimulate increased risks from corporate corruption: cutting corners in worker training and safety and in code compliance. Stop enabling another Deepwater Horizon disaster. People are sick and will be sick for the rest of their lives because of what happened six years ago. People are dead and dying early because of what happened six years ago.

The world is changing and your auctioning process is short-sighted, behind the times, heading the wrong way. You're putting the rights for using the Gulf of Mexico into the wrong hands. Stop your auction process.

What I know of your EIS for lease sale 247, I learned from this video / presentation by Beth Nord published on your website:http://www.boem.gov/Central-Planning-Area-247-Draft-EIS-Ne.../

It's imperative that you choose Option C: NO NEW LEASES -- STOP THE AUCTIONS!.

HV-3

What I see missing is any assessment of:
[1] how the fossil fuels extracted from the Gulf of Mexico contribute to greenhouse gas global warming phenomena
[2] how the fossil fuels extracted from the Gulf of Mexico have environmental impacts on communities fence line to refineries

HV-3

[3] how scientific predictions of increased weather intensity due to climate change is going to impact the risk and rate of damages to offshore infrastructure.

Please STOP HAVING LEASE AUCTIONS while you develop the process to add these components of analysis to your environmental impact assessments.

Sincerely,
Aly Tharp

HV-1 Comment noted.

HV-2 Refer to the response to comment MB-7.

HV-3 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Chapter 4.2.1.23.1 ("Land Use and Coastal Infrastructure") of the 2012-2017 WPA/CPA Multisale EIS discusses the current status of oil and gas infrastructure. The OCS oil- and gas-related infrastructure, a long-standing part of these regional economies that developed over the past several decades, is quite mature. The CPA proposed action would not require additional coastal infrastructure, with the possible exception of 0-1 new gas processing facility and 0-1 new pipeline landfall, and it would not alter the current land use of the analysis area. Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

PUBLIC SUBMISSION

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Tracking No. 1k0-8oyj-vjtj
Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0003
Comment from Kevin Ward, NA

Submitter Information

Name: Kevin Ward
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

ear BOEM,
KW-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.
KW-2 The inadequate draft supplemental environmental impact statement

KW-2 fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

KW-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

KW-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

KW-5 Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247. Oh, and solar is the answer, in case you have not heard.

KW-1 Comment noted.

KW-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

KW-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

KW-4 Information about the programmatic aspects of climate change relative to the environmental baseline for the Gulf of Mexico OCS Program can be found within each resource chapter found in Chapter 4.2 Appendix A.6, and Appendix G.3 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected sea-level rise and subsidence can be found in Chapter 3.3.4.1 of the 2012-2017 WPA/CPA Multisale EIS. Information about projected impacts related to coastal erosion, subsidence, and coastal storms on low-income and minority communities can be found in Chapter 4.2.1.23.4 of the 2012-2017 WPA/CPA Multisale EIS.

KW-5 Comment noted.

PUBLIC SUBMISSION

As of: 4/11/16 11:55 AM
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Tracking No. 1k0-8oyp-awed
Comments Due: April 11, 2016
Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0012
Comment from J. Marie WELDON, NA

Submitter Information

Name: J. Marie WELDON
Address:
[redacted]
Email: [redacted]
Organization: NA

General Comment

Dear BOEM,

JMW-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil and gas will deepen our climate crisis.

JMW-2

The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

This is the wrong direction. We have so little time left to really turn things around, and this venture would certainly make things worse.

Sincerely,
J. Marie Weldon

JMW-1 Comment noted.

JMW-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

PUBLIC SUBMISSION

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Tracking No. 1k0-8ozb-zmfp
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Submission Type: Web

Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0021
Comment from LaVonne Whelchel, NA

Submitter Information

Name: LaVonne Whelchel
Address:
[redacted]
Email: [redacted]
Phone: [redacted]
Organization: NA

General Comment

Dear BOEM,

LW-1 I am writing to you with an urgent request: Please CANCEL Central Planning Area Lease Sale 247 because the resulting production of oil

LW-1 and gas will deepen our climate crisis.

LW-2 The inadequate draft supplemental environmental impact statement fails to fully disclose the impacts of the lease sale including (1) greenhouse gas pollution, (2) oil spills, and (3) offshore fracking.

LW-3 Six years after the Deepwater Horizon spill, hundreds of miles of coastal habitat, sea turtles, sea birds, dolphins and other wildlife in the Gulf of Mexico are still suffering. Key fishing grounds have still not recovered. The draft supplement inadequately addresses the risks associated with the aging infrastructure of over 3,400 offshore rigs in the Gulf of Mexico, and the inevitable risk of oil spills resulting from the lease.

LW-4 The draft supplement also fails to evaluate the social impact of the lease sale. Communities within the Gulf of Mexico are at the front lines of climate change; tribes like isle de Jean Charles band of Biloxi, Chitimacha, and Choctaw have left their homes due to the effects of climate change. The sale of these leases will only exacerbate an impending social and economic catastrophe.

Climate change negatively impacts all of us, but communities on the front line of fossil fuel development in the Gulf of Mexico - most often people of color - have had to shoulder that burden disproportionately. Each step of fossil fuel development - extraction, transportation, refining, and burning - directly threatens the health and well-being of communities across the Gulf. It is time to stop treating the Gulf as a sacrifice zone for the fossil fuel industry, and halt new offshore drilling by cancelling Lease Sale 247.

LW-1 Comment noted.

LW-2 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Information regarding the impacts of accidental events, including oil spills, on each resource can in found in Chapter 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Updates regarding the impacts of accidental events, including oil spills for each resource, can be found in Chapter 4.2 of the WPA 233/CPA 231 Supplemental EIS, Chapter 4.1 and Appendix B of the CPA 235/241/247 Supplemental EIS and CPA 241/247 and EPA 226 Supplemental EIS, and **Chapter 4.1 and Appendix B** of this Supplemental EIS.

Refer to the response to comment CBD2-4 in regards to BOEM's analysis of well stimulation activities in the GOM.

LW-3 Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

LW-4 Refer to the response to comment CC-4.

CPA247, BOEM <cpa247@boem.gov>

END LEASE AUCTIONS NOW

1 message

Charlotte Willcox [redacted] Mon, Apr 11, 2016 at 2:48 PM
To: cpa247@boem.gov

That BOEM is considering withholding leases in ecologically significant areas, rather than already doing so as a practice, astounds me.To treat the entire Gulf of Mexico as first and foremost an industrial zone is a morally corrupt, tragic, and deadly mode of operation.

3,400 offshore rigs is enough to manage and maintain at a time when the fossil fuel industry -- including companies holding your leases -- owe their workers $40 million dollars in back-wages: http://www.usnews.com/news/articles/2016-04-04/oil-and-gas-companies-stiff-29-000-workers-out-of-40-million

The current financial situation of the fossil fuel industry is likely to stimulate increased risks from corporate corruption: cutting corners in worker training and safety and in code compliance. Stop enabling another Deepwater Horizon disaster. People are sick and will be sick for the rest of their lives because of what happened six years ago. People are dead and dying early because of what happened six years ago.

The world is changing and your auctioning process is short-sighted, behind the times, and heading the wrong way. You're putting the rights for using the Gulf of Mexico into the wrong hands. Stop your auction process.

CW-1

What I know of your EIS for lease sale 247, I learned from this video / presentation by Beth Nord published on your website:http://www.boem.gov/Central-Planning-Area-247-Draft-EIS-New-Orleans-Meeting/

It's imperative that you choose Option C: NO NEW LEASES -- STOP THE AUCTIONS.

What I see missing is any assessment of:
[1] how the fossil fuels extracted from the Gulf of Mexico contribute to greenhouse gas global warming phenomena
[2] how the fossil fuels extracted from the Gulf of Mexico have environmental impacts on communities fence line to refineries
[3] how scientific predictions of increased weather intensity due to climate change is going to impact the risk and rate of damages to offshore infrastructure.

Please STOP HAVING LEASE AUCTIONS while you develop the process to add these components of analysis to your environmental impact assessments.

Sincerely,

Mary Charlotte Willcox

CW-1 Refer to the response to comment CBD-4 in regards to BOEM's assessment of potential climate change impacts and treatment of GHG emissions.

Chapter 4.2.1.23.1 ("Land Use and Coastal Infrastructure") of the 2012-2017 WPA/CPA Multisale EIS discusses the current status of oil and gas infrastructure. The OCS oil- and gas-related infrastructure, a long-standing part of these regional economies that developed over the past several decades, is quite mature. The CPA proposed action would not require additional coastal infrastructure, with the possible exception of 0-1 new gas processing facility and 0-1 new pipeline landfall, and it would not alter the current land use of the analysis area. Refer to the response to comment CC-3 in regards to BOEM's analysis of aging infrastructure in the GOM.

Chapter 4.2.1.23.4 ("Environmental Justice") of the 2012-2017 WPA/CPA Multisale EIS provides a discussion of the extensive upstream support infrastructure system that exists to support offshore oil and gas and includes platform fabrication yards, shipyards, repair and maintenance yards, onshore service bases, heliports, marinas for crewboats and supply boats, pipe-coating companies, waste management facilities, and the downstream infrastructure, which moves hydrocarbon product to market and includes gas processing plants, petrochemical plants, transportation corridors, petroleum bulk storage facilities, and gas and petroleum pipelines. This infrastructure system is both widespread and concentrated. Much infrastructure is located in coastal Louisiana, less in coastal Texas, and less still in Mississippi's Jackson County and Alabama's Mobile County. While many fabrication and supply facilities are concentrated around coastal ports, downstream processing is concentrated more in industrial corridors farther inland (The Louis Berger Group, Inc., 2004).

A discussion of hurricane impacts to offshore infrastructure and pipelines can be found throughout the 2012-2017 WPA/CPA Multisale EIS. Chapters 3.1.1.9.3 and 3.3.5.2 of the 2012-2017 WPA/CPA Multisale EIS include a discussion of the significance of hurricane damage to offshore infrastructure and pipelines. Hurricanes are the main cause of damage to offshore infrastructure and pipelines in the context of the potential for an oil spill. In Chapter 4.2 of the 2012-2017 WPA/CPA Multisale EIS, the impacts from storms on the physical and biological environments, socioeconomic activities, and OCS oil- and gas-related infrastructure are addressed. Potential impacts to resources from oil spills resulting from damage to offshore infrastructure by tropical storms and the vulnerability of offshore infrastructure to damage from future storms to various resources were discussed in relation to multiple resources. Chapters 4.2.1.3 and 4.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS also discuss aging infrastructure, including both OCS Program and State oil and gas platforms and pipelines, and identifies these types of infrastructure as a potential source of both inland and offshore spills. The 2012-2017 WPA/CPA Multisale EIS acknowledges that over 3,000 production platforms in the Gulf of Mexico are over 20 years old and were constructed prior to the modern structural requirements that increase endurance to hurricane force winds (Casselman, 2010). Early studies (Pulsipher et al., 1998) found that the age of a platform significantly affects the risk of an oil-spill accident during the exploration and production operations. Older pipelines are more susceptible to leaks through corrosion. As a result of how the older pipelines are constructed, these pipelines cannot be monitored or periodically inspected for potential leaks or pipeline weakness with modern, automated, high-tech pipe inspection and monitoring techniques; therefore, the potential for preventing a potential leak is small. The potential for onshore and nearshore spills may decrease as a result of more stringent regulations and new policies that call for increased enforcement to address properly plugging and dismantling abandoned wells.

PUBLIC SUBMISSION

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Docket: BOEM-2015-0141
BOEM Issues a Notice of Availability of the Draft Supplemental Environmental Impact Statement for Proposed Gulf of Mexico OCS Oil and Gas Central Planning Area Lease Sale 247

Comment On: BOEM-2015-0141-0001
Environmental Impact Statements; Availability, etc.: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sale, Central Planning Area Lease Sale 247

Document: BOEM-2015-0141-DRAFT-0022
Comment from Mickey York, NA

Submitter Information

Name: Mickey York
Address:
[redacted]
Email: [redacted]
Phone: [redacted]
Organization: NA

General Comment

MY-1

Please cancel CPA Lease Sale 247 as it will deepen our climate crisis. We want to build on the Paris agreements and this lease sales rush counter to those goals.

MY-1 Comment noted.

CPA247, BOEM <cpa247@boem.gov>

BOEM Lease Auction should be stopped: No New Leases!

1 message

Alec Johnson [redacted] Tue, Apr 12, 2016 at 9:58 AM
To: cpa247@boem.gov

AJ-1

I'm writing in reference to the proposed auction in the Gulf Coast of oil and gas drilling leases. I believe this is a highly irresponsible move for the government to take, particularly given the considerable inaction elsewhere to prevent the towering menace of runaway global warming. Public Trust doctrine should prevent this auction from ever taking place. Morally anyone physically resisting your efforts would be both legally and morally justified in doing so.

Don't sell our children's future out for profit. Ever!

Most seriously yours,
Alec Johnson
[redacted]

AJ-1 Comment noted.

CHAPTER 6

REFERENCES CITED

6. REFERENCES CITED

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CHAPTER 7

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7. PREPARERS

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CHAPTER 8

GLOSSARY

8. GLOSSARY

Acute—Sudden, short term, severe, critical, crucial, intense, but usually of short duration.

Anaerobic—Capable of growing in the absence of molecular oxygen.

Annular preventer—A component of the pressure control system in the BOP that forms a seal in the annular space around any object in the wellbore or upon itself, enabling well control operations to commence.

Anthropogenic—Coming from human sources, relating to the effect of humankind on nature.

API gravity—A standard adopted by the American Petroleum Institute for expressing the specific weight of oil.

Aromatic—Class of organic compounds containing benzene rings or benzenoid structures.

Attainment area—An area that is shown by monitored data or by air-quality modeling calculations to be in compliance with primary and secondary ambient air quality standards established by USEPA.

Barrel (bbl)—A volumetric unit used in the petroleum industry; equivalent to 42 U.S. gallons or 158.99 liters.

Benthic—On or in the bottom of the sea.

Biological Opinion—The FWS or NMFS evaluation of the impact of a proposed action on endangered and threatened species, in response to formal consultation under Section 7 of the Endangered Species Act.

Block—A geographical area portrayed on official BOEM protraction diagrams or leasing maps that contains approximately 2,331 ha (9 mi^2).

Blowout—An uncontrolled flow of fluids below the mudline from appurtenances on a wellhead or from a wellbore.

Blowout preventer (BOP)—One of several valves installed at the wellhead to prevent the escape of pressure either in the annular space between the casing and drill pipe or in open hole (i.e., hole with no drill pipe) during drilling completion operations. Blowout preventers on jackup or platform rigs are located at the water's surface; on floating offshore rigs, BOP's are located on the seafloor.

Bottom kill—A wild well-control procedure involving the intersection of an uncontrolled well with a relief well for the purpose of pumping heavy mud or cement into the wild well to stanch the flow of oil or gas (the well-control strategy for the *Macondo* spill deployed in mid-July 2010 that resulted in the successful capping of the well).

Cetacean—Aquatic mammal of the order Cetacea, such as whales, dolphins, and porpoises.

Chemosynthetic—Organisms that obtain their energy from the oxidation of various inorganic compounds rather than from light (photosynthetic).

Coastal waters—Waters within the geographical areas defined by each State's Coastal Zone Management Program.

Coastal wetlands—forested and nonforested habitats, mangroves, and marsh islands exposed to tidal activity. These areas directly contribute to the high biological productivity of coastal waters by input of detritus and nutrients, by providing nursery and feeding areas for shellfish and finfish, and by serving as habitat for birds and other animals.

Coastal zone—The coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder) strongly influenced by each other and in proximity to the shorelines of several coastal states; the zone includes islands, transitional and intertidal areas, salt marshes, wetlands, and beaches, and it extends seaward to the outer limit of the United States territorial sea. The zone extends inland from the shorelines only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters. Excluded from the coastal zone are lands the use of which is by law subject to the discretion of or which is held in trust by the Federal Government, its officers, or agents (also refer to State coastal zone boundaries).

Completion—Conversion of a development well or an exploration well into a production well.

Condensate—Liquid hydrocarbons produced with natural gas; they are separated from the gas by cooling and various other means. Condensates generally have an API gravity of 50°-120°.

Continental margin—The ocean floor that lies between the shoreline and the abyssal ocean floor, includes the continental shelf, continental slope, and continental rise.

Continental shelf—General term used by geologists to refer to the continental margin province that lies between the shoreline and the abrupt change in slope called the shelf edge, which generally occurs in the Gulf of Mexico at about the 200-m (656-ft) water depth. The continental shelf is characterized by a gentle slope (about 0.1^{o}). This is different from the juridical term used in Article 76 of the United Nations Convention on the Law of the Sea Royalty Payment (refer to the definition of Outer Continental Shelf).

Continental slope—The continental margin province that lies between the continental shelf and continental rise, characterized by a steep slope (about 3°-6°).

Critical habitat—Specific areas essential to the conservation of a protected species and that may require special management considerations or protection.

Crude oil—Petroleum in its natural state as it emerges from a well or after it passes through a gas-oil separator, but before refining or distillation. An oily, flammable, bituminous liquid that is essentially a complex mixture of hydrocarbons of different types with small amounts of other substances.

***Deepwater Horizon* explosion, oil spill, and response**—All actions stemming from the April 20, 2010, explosion and subsequent sinking of the Transocean drillship *Deepwater Horizon* up to and including the *Macondo* well kill declaration on September 19, 2010.

Delineation well—A well that is drilled for the purpose of determining the size and/or volume of an oil or gas reservoir.

Demersal—Living at or near the bottom of the sea.

Development—Activities that take place following discovery of economically recoverable mineral resources, including geophysical surveying, drilling, platform construction, operation of onshore support facilities, and other activities that are for the purpose of ultimately producing the resources.

Development and Production Plan (DPP)—A document that must be prepared by the operator and submitted to BOEM for approval before any development and production activities are conducted on a lease or unit in any OCS area other than the western Gulf of Mexico.

Development Operations Coordination Document (DOCD)—A document that must be prepared by the operator and submitted to BOEM for approval before any development or production activities are conducted on a lease in the western Gulf of Mexico.

Development well—A well drilled to a known producing formation to extract oil or gas; a production well; distinguished from a wildcat or exploration well and from an offset well.

Direct employment—Consists of those workers involved in the primary industries of oil and gas exploration, development, and production operations (Standard Industrial Classification Code 13—Oil and Gas Extraction).

Discharge—Something that is emitted; flow rate of a fluid at a given instant expressed as volume per unit of time.

Dispersant—A suite of chemicals and solvents used to break up an oil slick into small droplets, which increases the surface area of the oil and hastens the processes of weathering and microbial degradation.

Dispersion—A suspension of finely divided particles in a medium.

Drilling mud—A mixture of clay, water or refined oil, and chemical additives pumped continuously downhole through the drill pipe and drill bit, and back up the annulus between the pipe and the walls of the borehole to a surface pit or tank. The mud lubricates and cools the drill bit, lubricates the drill pipe as it turns in the wellbore, carries rock cuttings to the surface, serves to keep the hole from crumbling or collapsing, and provides the weight or hydrostatic head to prevent extraneous fluids from entering the well bore and to downhole pressures; also called drilling fluid.

Economically recoverable resources—An assessment of hydrocarbon potential that takes into account the physical and technological constraints on production and the influence of costs of exploration and development and market price on industry investment in OCS exploration and production.

Effluent—The liquid waste of sewage and industrial processing.

Effluent limitations—Any restriction established by a State or the USEPA on quantities, rates, and concentrations of chemical, physical, biological, and other constituents discharged from point sources into U.S. waters, including schedules of compliance.

Epifaunal—Animals living on the surface of hard substrate.

Essential habitat—Specific areas crucial to the conservation of a species and that may necessitate special considerations.

Estuary—Coastal semienclosed body of water that has a free connection with the open sea and where freshwater meets and mixes with seawater.

Eutrophication—Enrichment of nutrients in the water column by natural or artificial methods accompanied by an increase of respiration, which may create an oxygen deficiency.

Exclusive Economic Zone (EEZ)—The maritime region extending 200 nmi (230 mi; 370 km) from the baseline of the territorial sea, in which the United States has exclusive rights and jurisdiction over living and nonliving natural resources.

Exploration Plan (EP)—A plan that must be prepared by the operator and submitted to BOEM for approval before any exploration or delineation drilling is conducted on a lease.

Exploration well—A well drilled in unproven or semi-proven territory to determining whether economic quantities of oil or natural gas deposit are present.

False crawls—Refers to when a female sea turtle crawls up on the beach to nest (perhaps) but does not and returns to the sea without laying eggs.

Field—An accumulation, pool, or group of pools of hydrocarbons in the subsurface. A hydrocarbon field consists of a reservoir in a shape that will trap hydrocarbons and that is covered by an impermeable, sealing rock.

Floating production, storage, and offloading (FPSO) system—A tank vessel used as a production and storage base; produced oil is stored in the hull and periodically offloaded to a shuttle tanker for transport to shore.

Gathering lines—A pipeline system used to bring oil or gas production from a number of separate wells or production facilities to a central trunk pipeline, storage facility, or processing terminal.

Geochemical—Of or relating to the science dealing with the chemical composition of and the actual or possible chemical changes in the crust of the earth.

Geophysical survey—A method of exploration in which geophysical properties and relationships are measured remotely by one or more geophysical methods.

Habitat—A specific type of environment that is occupied by an organism, a population, or a community.

Hermatypic coral—Reef-building corals that produce hard, calcium carbonate skeletons and that possess symbiotic, unicellular algae within their tissues.

Harassment—An intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, feeding or sheltering.

Hydrocarbons—Any of a large class of organic compounds containing primarily carbon and hydrogen. Hydrocarbon compounds are divided into two broad classes: aromatic and aliphatics. They occur primarily in petroleum, natural gas, coal, and bitumens.

Hypoxia—Depressed levels of dissolved oxygen in water, usually resulting in decreased metabolism.

Incidental take—Takings that result from, but are not the purpose of, carrying out an otherwise lawful activity (e.g., fishing) conducted by a Federal agency or applicant (refer to Taking).

Indirect employment—Secondary or supporting oil- and gas-related industries, such as the processing of crude oil and gas in refineries, natural gas plants, and petrochemical plants.

Induced employment—Tertiary industries that are created or supported by the expenditures of employees in the primary or secondary industries (direct and indirect employment), including consumer goods and services such as food, clothing, housing, and entertainment.

Infrastructure—The facilities associated with oil and gas development, e.g., refineries, gas processing plants, etc.

Jack-up rig—A barge-like, floating platform with legs at each corner that can be lowered to the sea bottom to raise the platform above the water.

Kick—A deviation or imbalance, typically sudden or unexpected, between the downward pressure exerted by the drilling fluid and the upward pressure of in-situ formation fluids or gases.

Landfall—The site where a marine pipeline comes to shore.

Lease—Authorization that is issued under Section 8 or maintained under Section 6 of the Outer Continental Shelf Lands Act and that authorizes exploration for, and development and production of, minerals.

Lease sale—The competitive auction of leases granting companies or individuals the right to explore for and develop certain minerals under specified conditions and periods of time.

Lease term—The initial period for oil and gas leases, usually a period of 5, 8, or 10 years depending on water depth or potentially adverse conditions.

Lessee—A party authorized by a lease, or an approved assignment thereof, to explore for and develop and produce the leased deposits in accordance with regulations at 30 CFR part 250 and 30 CFR part 550.

Lower marine riser package—The head assembly of a subsurface well at the point where the riser connects to a blowout preventer.

***Macondo*—**Prospect name given by BP to the Mississippi Canyon Block 252 exploration well that the *Deepwater Horizon* rig was drilling when a blowout occurred on April 20, 2010.

***Macondo* spill—**The name given to the oil spill that resulted from the explosion and sinking of the *Deepwater Horizon* rig, which began on April 20, 2010.

Marshes—Persistent, emergent, nonforested wetlands characterized by predominantly cordgrasses, rushes, and cattails.

Military warning area—An area established by the U.S. Department of Defense within which military activities take place.

Minerals—As used in this document, minerals include oil, gas, sulphur, and associated resources, and all other minerals authorized by an Act of Congress to be produced from public lands as defined in Section 103 of the Federal Land Policy and Management Act of 1976.

Naturally occurring radioactive materials (NORM)—naturally occurring material that emits low levels of radioactivity, originating from processes not associated with the recovery of radioactive material. The radionuclides of concern in NORM are Radium-226, Radium-228, and other isotopes in the radioactive decay chains of uranium and thorium.

Nepheloid—A layer of water near the bottom that contains significant amounts of suspended sediment.

Nonattainment area—An area that is shown by monitoring data or by air-quality modeling calculations to exceed primary or secondary ambient air quality standards established by USEPA.

Nonhazardous oil-field wastes (NOW)—Wastes generated by exploration, development, or production of crude oil or natural gas that are exempt from hazardous waste regulation under the Resource Conservation and Recovery Act (*Regulatory Determination for Oil and Gas and Geothermal Exploration, Development and Production Wastes,* dated June 29, 1988, 53 FR 25446; July 6, 1988). These wastes may contain hazardous substances.

Offloading—Unloading liquid cargo, crude oil, or refined petroleum products.

Operational discharge—Any incidental pumping, pouring, emitting, emptying, or dumping of wastes generated during routine offshore drilling and production activities.

Operator—An individual, partnership, firm, or corporation having control or management of operations on a leased area or portion thereof. The operator may be a lessee, designated agent of the lessee, or holder of operating rights under an approved operating agreement.

Organic matter—Material derived from living plants or animals.

Outer Continental Shelf (OCS)—All submerged lands that comprise the continental margin adjacent to the United States and seaward of State offshore lands.

Pelagic—Of or pertaining to the open sea; associated with open water beyond the direct influence of coastal systems.

Plankton—Passively floating or weakly motile aquatic plants (phytoplankton) and animals (zooplankton).

Platform—A steel or concrete structure from which offshore development wells are drilled.

Play—A prospective subsurface area for hydrocarbon accumulation that is characterized by a particular structural style or depositional relationship.

Primary production—Organic material produced by photosynthetic or chemosynthetic organisms.

Produced water—Total water discharged from the oil and gas extraction process; production water or production brine.

Production—Activities that take place after the successful completion of any means for the extraction of resources, including bringing the resource to the surface, transferring the produced resource to shore, monitoring operations, and drilling additional wells or workovers.

Province—A spatial entity with common geologic attributes. A province may include a single dominant structural element such as a basin or a fold belt, or a number of contiguous related elements.

Ram—The main component of a blowout preventer designed to shear casing and tools in a wellbore or to seal an empty wellbore. A blind shear ram accomplishes the former and a blind ram the latter.

Recoverable reserves—The portion of the identified hydrocarbon or mineral resource that can be economically extracted under current technological constraints.

Recoverable resource estimate—An assessment of hydrocarbon or mineral resources that takes into account the fact that physical and technological constraints dictate that only a portion of resources can be brought to the surface.

Recreational beaches—Frequently visited, sandy areas along the Gulf of Mexico shorefront that support multiple recreational activities at the land-water interface. Included are National Seashores, State Park and Recreational Areas, county and local parks, urban beachfronts, and private resorts.

Refining—Fractional distillation of petroleum, usually followed by other processing (e.g., cracking).

Relief—The difference in elevation between the high and low points of a surface.

Reserves—Proved oil or gas resources.

Rig—A structure used for drilling an oil or gas well.

Riser insertion tube tool—A "straw" and gasket assembly improvised during the *Macondo* spill response that was designed to siphon oil and gas from the broken riser of the *Deepwater Horizon* rig lying on the sea bottom (an early recovery strategy for the *Macondo* spill in May 2010).

Royalty—A share of the minerals produced from a lease paid in either money or "in-kind" to the landowner by the lessee.

Saltwater intrusion—Saltwater invading a body of freshwater.

Sciaenids—Fishes belonging to the croaker family (Sciaenidae).

Seagrass beds—More or less continuous mats of submerged, rooted, marine, flowering vascular plants occurring in shallow tropical and temperate waters. Seagrass beds provide habitat, including breeding and feeding grounds, for adults and/or juveniles of many of the economically important shellfish and finfish.

Sediment—Material that has been transported and deposited by water, wind, glacier, precipitation, or gravity; a mass of deposited material.

Seeps (hydrocarbon)—Gas or oil that reaches the surface along bedding planes, fractures, unconformities, or fault planes.

Sensitive area—An area containing species, populations, communities, or assemblages of living resources, that is susceptible to damage from normal OCS oil- and gas-related activities. Damage includes interference with established ecological relationships.

Shear ram—The component in a BOP that cuts, or shears, through the drill pipe and forms a seal against well pressure. Shear rams are used in floating offshore drilling operations to provide a quick method of moving the rig away from the hole when there is no time to trip the drill stem out of the hole.

Shoreline Cleanup and Assessment Team—The on-the-scene responders for post-spill shoreline protection who established priorities, standardized procedures, and terminology.

Spill of National Significance—Designation by the USEPA Administrator under 40 CFR § 300.323 for discharges occurring in the inland zone and the Commandant of the U.S. Coast Guard for discharges occurring in the coastal zone, authorizing the appointment of a National Incident Commander for spill-response activity.

State coastal zone boundary—The State coastal zone boundaries for each CZMA-affected State are defined at http://coastalmanagement.noaa.gov/mystate/docs/StateCZBoundaries.pdf.

Structure—Any OCS facility that extends from the seafloor to above the waterline; in petroleum geology, any arrangement of rocks that may hold an accumulation of oil or gas.

Subarea—A discrete analysis area.

Subsea isolation device—An emergency disconnection and reconnection assembly for the riser at the seafloor.

Supply vessel—A boat that ferries food, water, fuel, and drilling supplies and equipment to an offshore rig or platform and returns to land with refuse that cannot be disposed of at sea.

Taking—To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any endangered or threatened species, or to attempt to engage in any such conduct (including actions that induce stress, adversely impact critical habitat, or result in adverse secondary or cumulative impacts). Harassments are the most common form of taking associated with OCS Program activities.

Tension-leg platform (TLP)—A production structure that consists of a buoyant platform tethered to concrete pilings on the seafloor with flexible cable.

Total dissolved solids—The total amount of solids that are dissolved in water.

Total suspended particulate matter—The total amount of suspended solids in water.

Total suspended solids—The total amount of suspended solids in water.

Trunkline—A large-diameter pipeline receiving oil or gas from many smaller tributary gathering lines that serve a large area; common-carrier line; main line.

Turbidity—Reduced water clarity due to the presence of suspended matter.

Volatile organic compound (VOC)—Any organic compound that is emitted to the atmosphere as a vapor.

Water test areas—Areas within the eastern Gulf where U.S. Department of Defense research, development, and testing of military planes, ships, and weaponry take place.

Weathering (of oil)—The aging of oil due to its exposure to the atmosphere, causing marked alterations in its physical and chemical makeup.

FIGURES

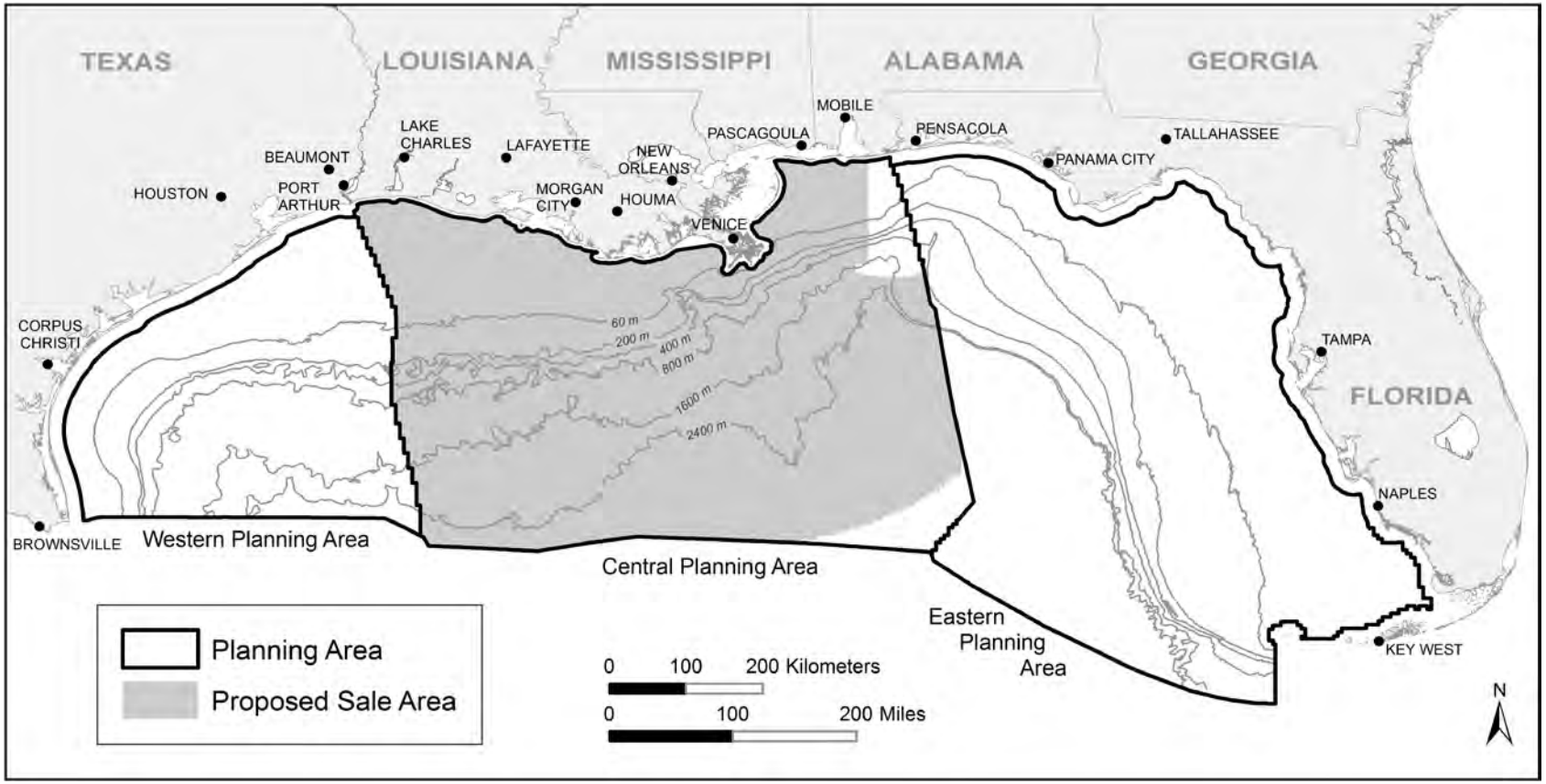

Figure 1-1. Gulf of Mexico Planning Areas, Proposed CPA Lease Sale Area, and Locations of Major Cities.

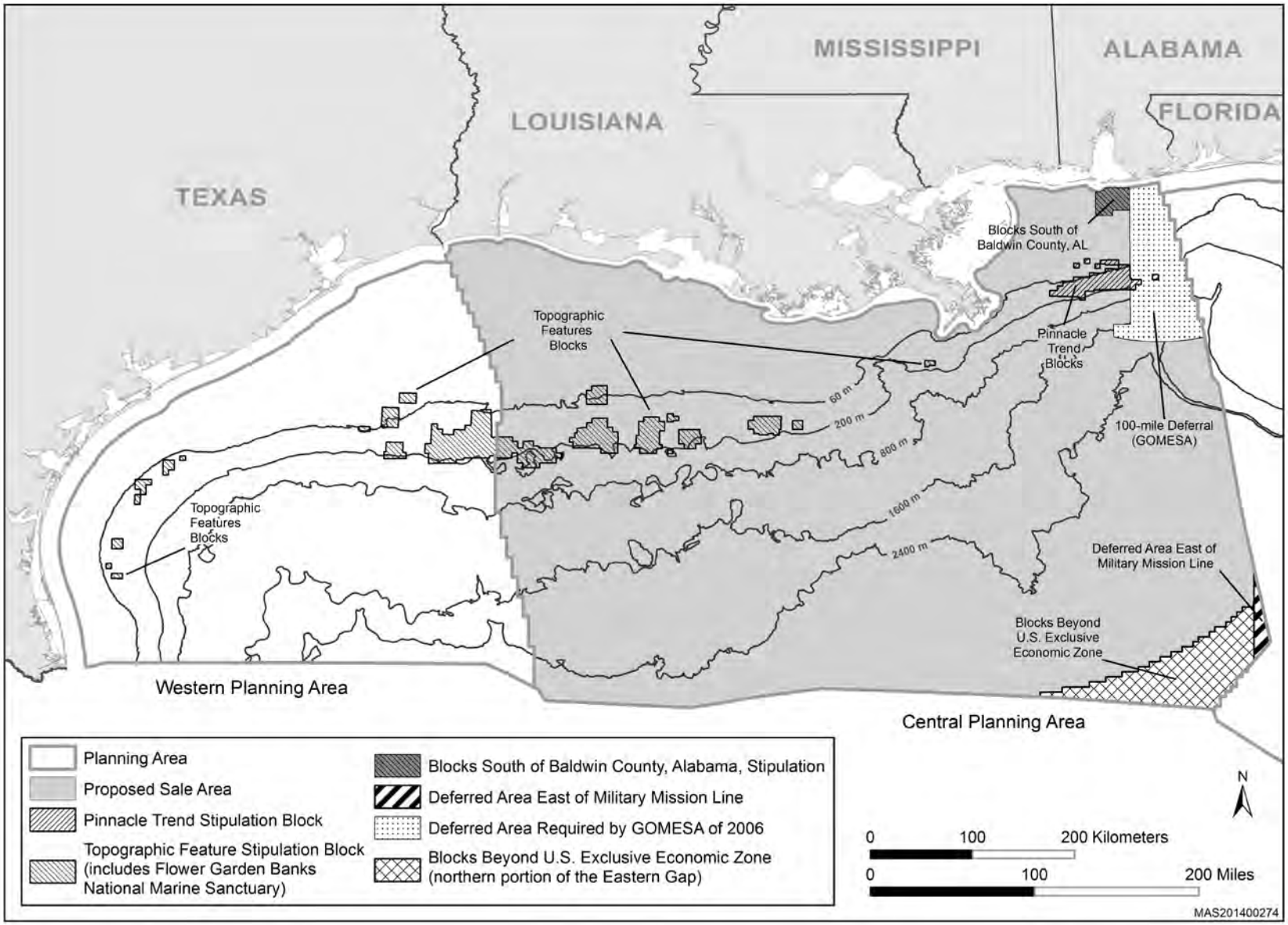

Figure 2-1. Location of Proposed Stipulations and Deferrals.

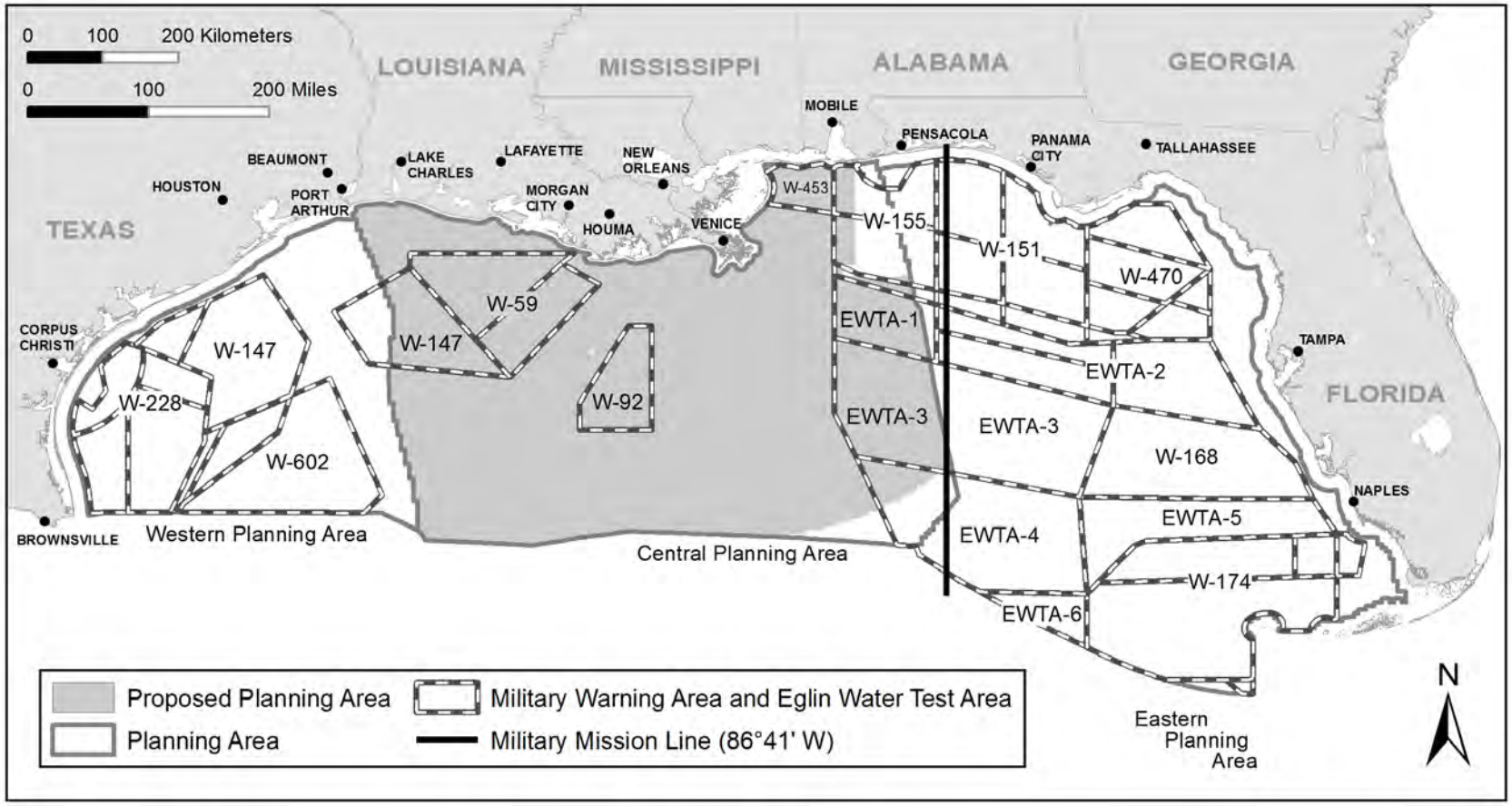

Figure 2-2. Military Warning Areas and Eglin Water Test Areas in the Gulf of Mexico.

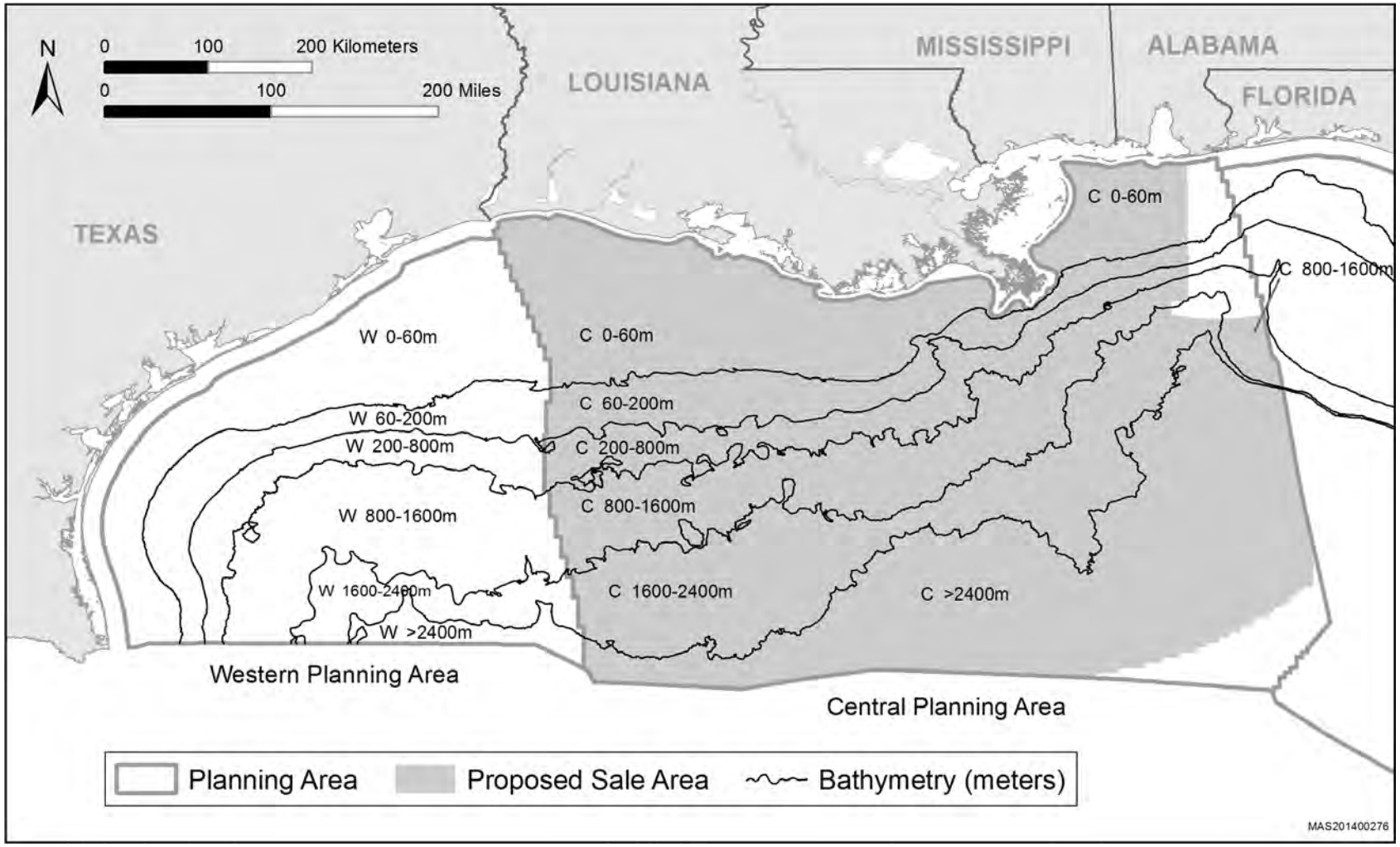

Figure 3-1. Offshore Subareas in the Gulf of Mexico.

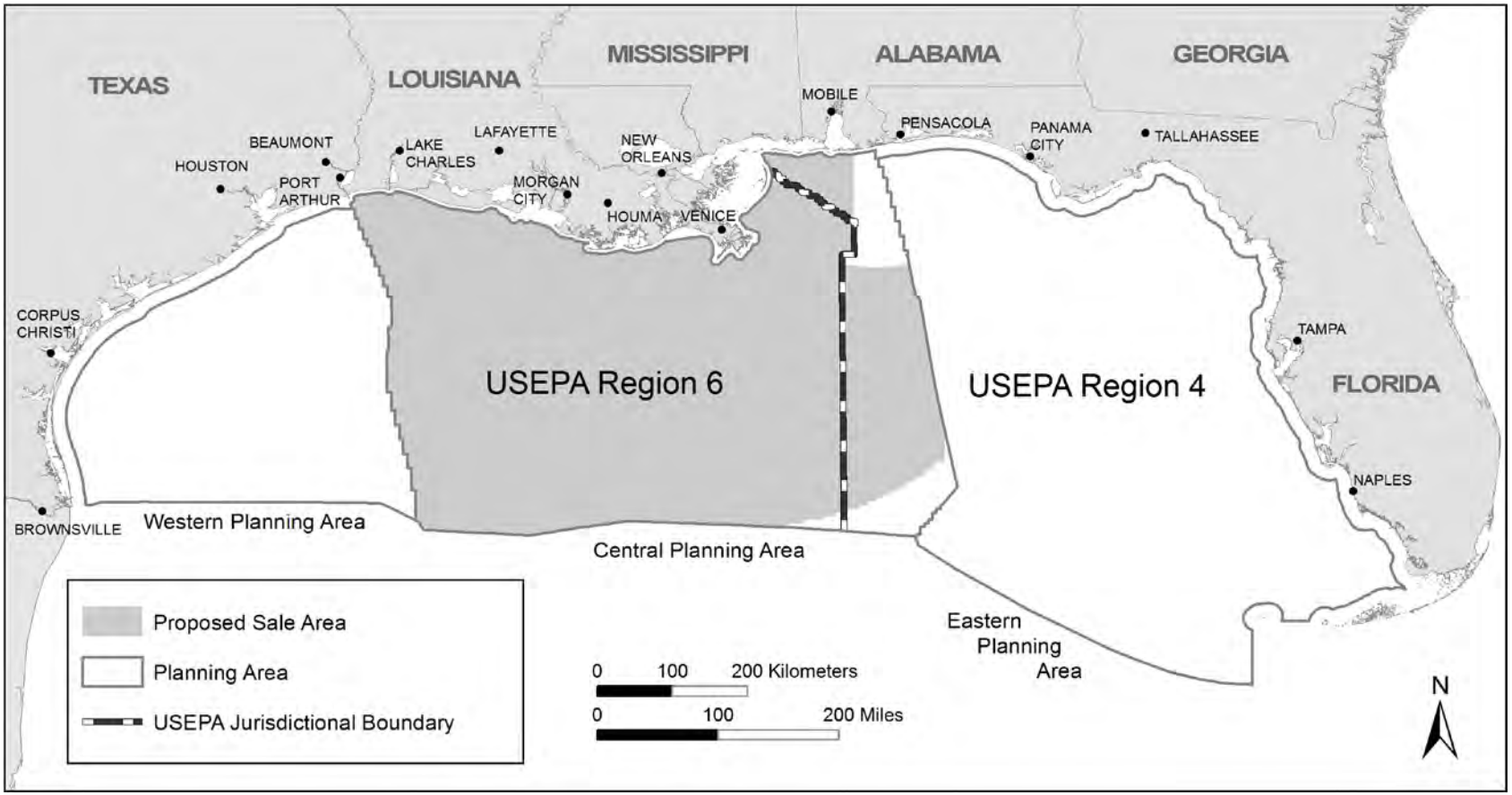

Figure 3-2. Water Quality Jurisdictional Boundaries for USEPA Regions 4 and 6.

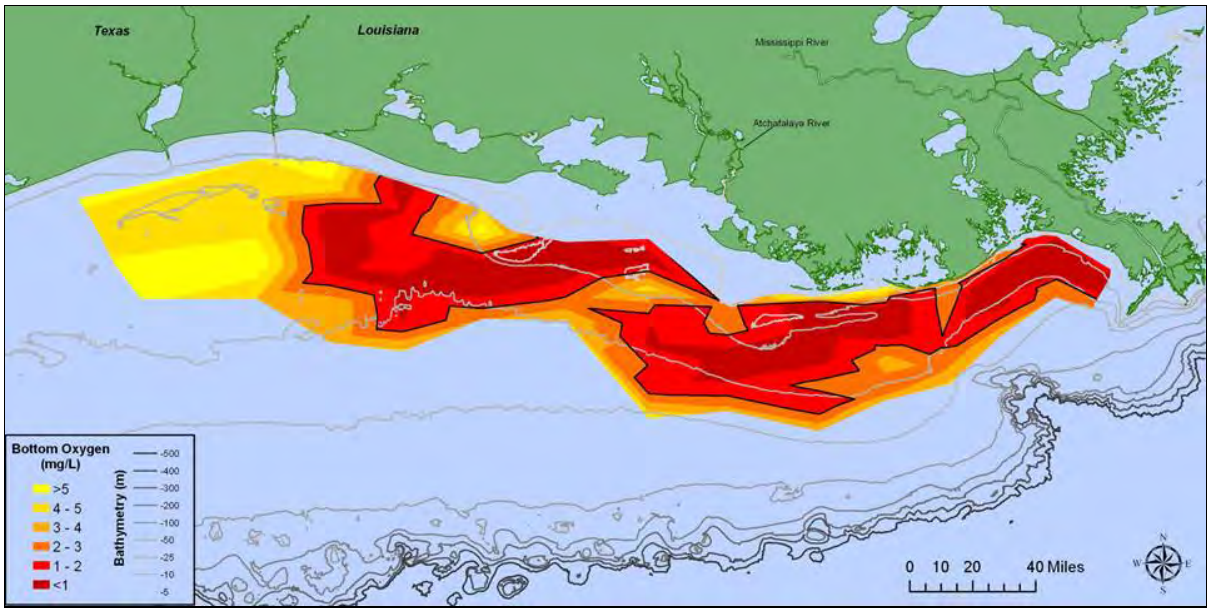

Figure 4-1. Distribution of Bottom-Water Dissolved Oxygen from July 28 to August 3, West of the Mississippi River Delta (black-lined areas, i.e., the areas in red to deep red, have very little dissolved oxygen) (USDOC, NOAA, 2015).

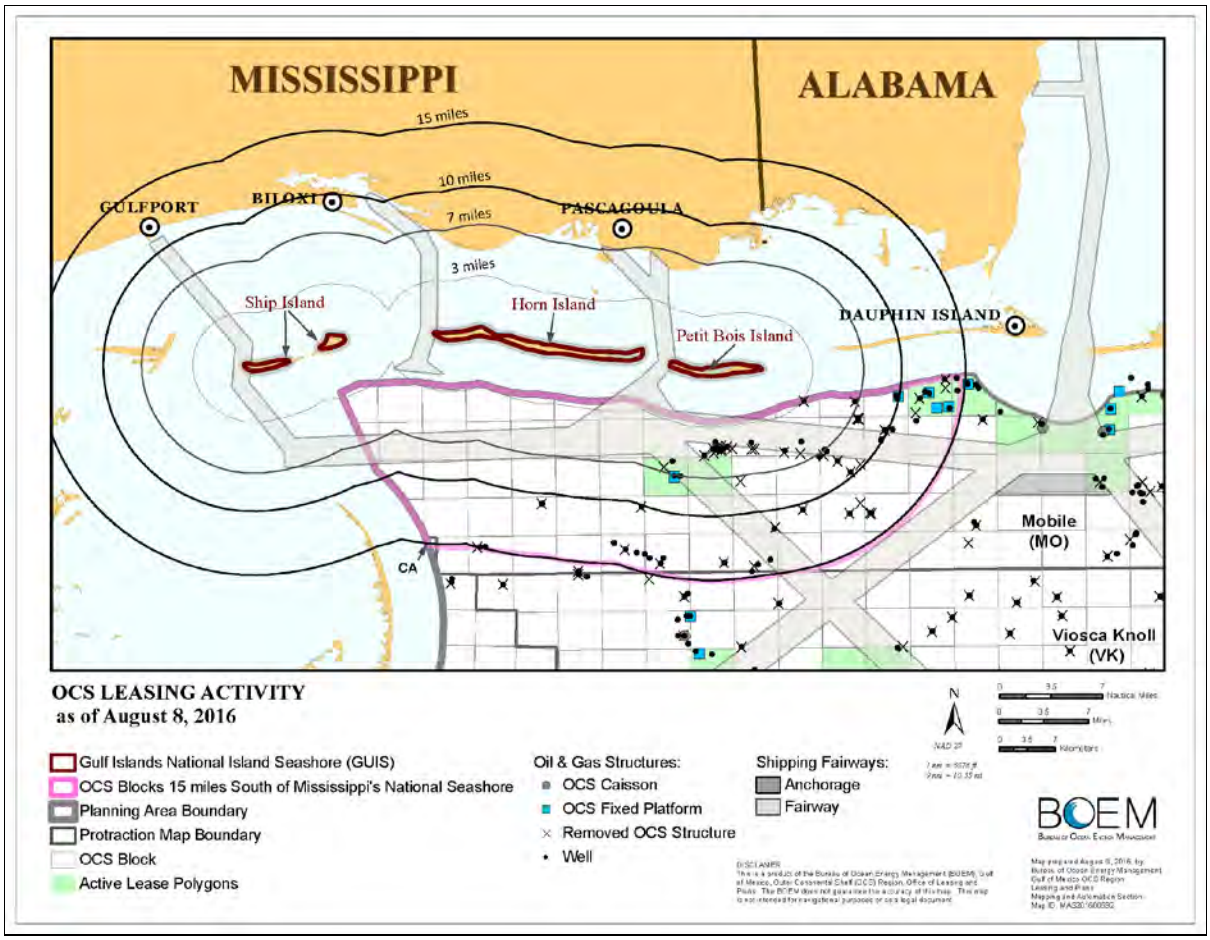

Figure 4-2. OCS Leasing Activity Near the Gulf Islands National Seashore.

Figure 4-3. Photograph of Remaining OCS Structures taken from Petit Bois Island Looking South (modified and reprinted with permission from Bob Marsh [official communication, 2016]). (Petit Bois Island is within the Gulf Islands National Seashore and is a National Park Service-designated wilderness area.)

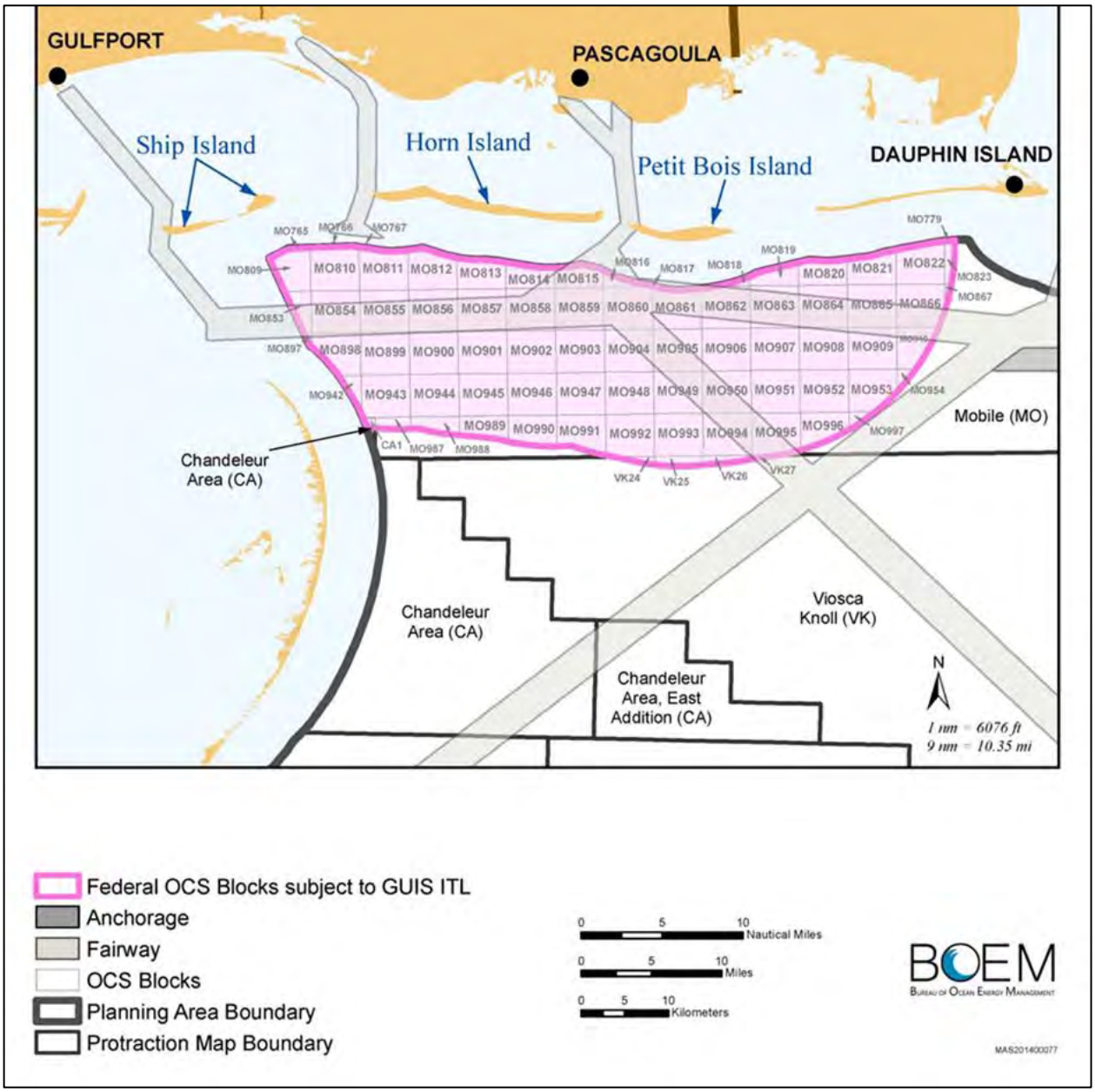

Figure 4-4. Federal OCS Lease Blocks Subject to the Gulf Islands National Seashore Information to Lessees.

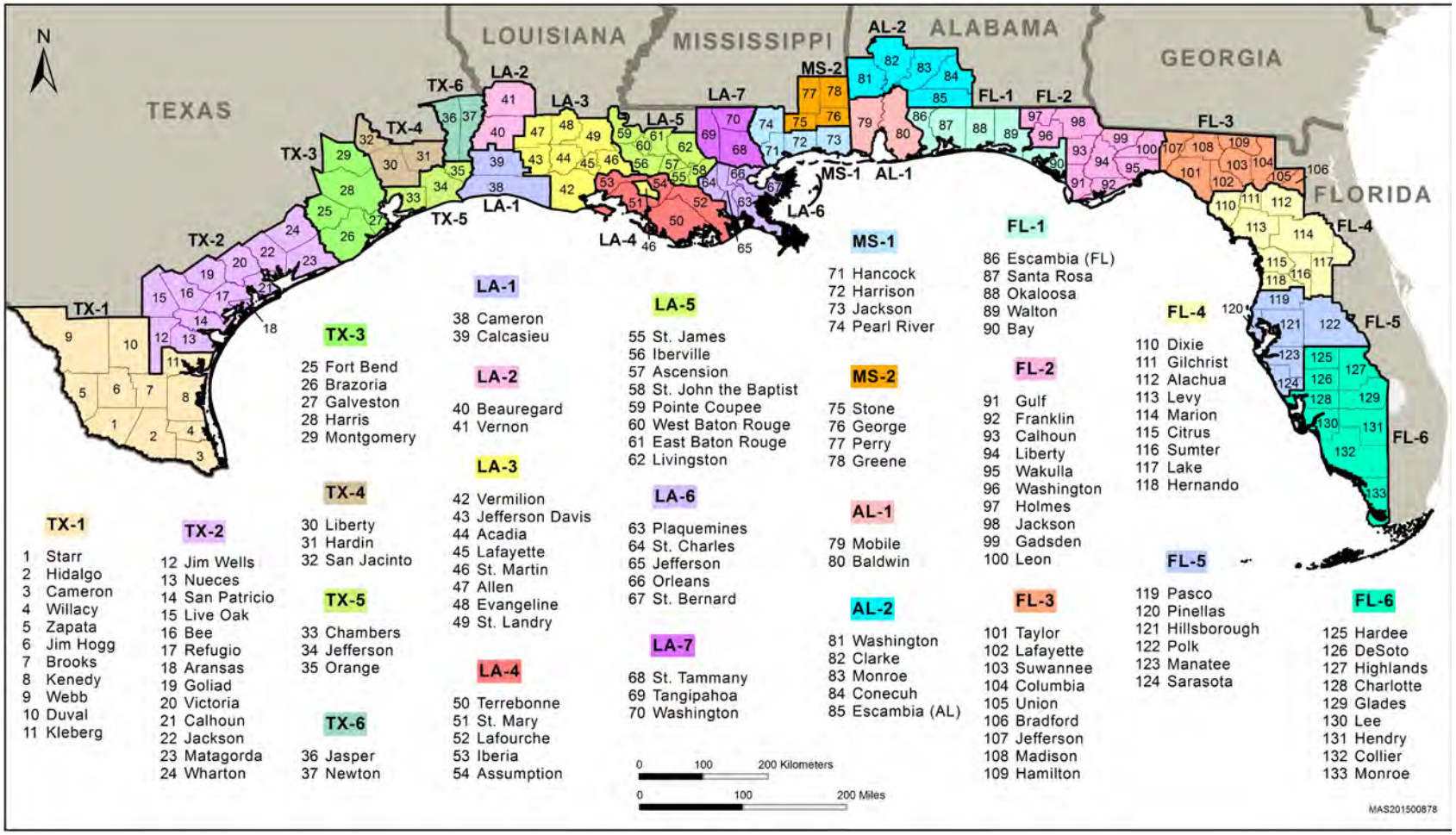

Figure 4-5. Economic Impact Areas in the Gulf of Mexico.

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TABLES

Table 3-1

Projected Oil and Gas in the Gulf of Mexico OCS

	Typical Lease Sale	OCS Cumulative (2012-2051)
Western Planning Area		
Reserve/Resource Production		
Oil (BBO)	0.116-0.200	2.510-3.696
Gas (Tcf)	0.538-0.938	12.539-18.434
Central Planning Area		
Reserve/Resource Production		
Oil (BBO)	0.460-0.894	15.825-21.733
Gas (Tcf)	1.939-3.903	63.347-92.691
Eastern Planning Area		
Reserve/Resource Production		
Oil (BBO)	0-0.071	0-0.211
Gas (Tcf)	0-0.162	0-0.502

BBO = billion barrels of oil
Tcf = trillion cubic feet

Table 3-2

Offshore Scenario Information Related to a Typical Lease Sale in the Central Planning Area

	Offshore Subareas[1]						Total CPA[2]
	0-60 m	60-200 m	200-800 m	800-1,600 m	1,600-2,400 m	>2,400 m	
Wells Drilled							
Exploration and Delineation Wells	62-121	24-46	21-42	15-29	18-36	28-55	168-329
Development and Production Wells	78-152	32-58	26-53	20-38	24-46	35-70	215-417
Producing Oil Wells	11-21	5-8	16-32	12-23	15-29	22-43	81-156
Producing Gas Wells	58-115	23-44	7-15	5-10	6-11	9-19	108-241
Production Structures							
Installed	28-54	3-6	1-2	1	1-2	1-2	35-67
Removed Using Explosives	18-36	2-4	0	0	0	0	20-40
Total Removed	25-49	3-5	1-2	1	1-2	1-2	32-61
Method of Transportation[3]							
Percent Piped	>99%	>99%	>99%	>99%	90->99%		93->99%
Percent Barged	<1%	0%	0%	0%	0%		<1%
Percent Tankered[4]	0%	0%	0%	0%	0-10%		0-6%
Length of Installed Pipelines (km)[5]	216-586	NA	NA	NA	NA	NA	628-1,870
Service-Vessel Trips (1,000's round trips)	32-61	5-10	3-6	17-19	18-35	19-37	94-168
Helicopter Operations (1,000's operations)	557-1,470	63-163	21-54	14-36	21-54	21-54	696-1,815

[1] Refer to **Figure 3-1**.

[2] Subareas totals may not add up to the planning area total because of rounding.

[3] 100% of gas is assumed to be piped.

[4] Tankering is forecasted to occur only in water depths >1,600 m.

[5] Projected length of pipelines does not include length in State waters.

NA = not available.

Table 3-3

Offshore Scenario Information Related to OCS Program Activities in the Gulf of Mexico (WPA, CPA, and EPA) for 2012-2051

	Offshore Subareas[1]						Total OCS[2]
	0-60 m	60-200 m	200-800 m	800-1,600 m	1,600-2,400 m	>2,400 m	
Wells Drilled							
Exploration and Delineation Wells	2,730-3,900	990-1,390	920-1,350	700-960	770-1,030	790-1,170	6,910-9,827
Development and Production Wells	3,380-4,820	1,240-1,730	1,130-1,670	860-1,190	950-1,280	970-1,450	8,530-12,180
Producing Oil Wells	520-701	215-278	704-1,030	574-783	663-873	620-915	3,296-4,605
Producing Gas Wells	2,510-3,629	885-1,272	306-470	196-287	187-267	250-385	4,334-6,320
Production Structures							
Installed	1,210-1,720	110-160	26-40	25-30	32-33	32-38	1,435-2,026
Removed Using Explosives	796-1,139	69-104	3-4	0	0	0	868-1,247
Total Removed	1,090-1,560	100-150	24-34	20-28	23-30	22-33	1,279-1,837
Method of Transportation[3]							
Percent Piped	>99%	>99%	>99%	>99%	87->99%		92->99%
Percent Barged	<1%	0%	0%	0%	0%		<1%
Percent Tankered[4]	0%	0%	0%	0%	0-13%		0-7%
Length of Installed Pipelines (km)[5]	10,482-21,121	NA	NA	NA	NA	NA	30,428-69,749
Service-Vessel Trips (1,000's round trips)	1,366-1,942	196-280	111-162	466-619	584-626	587-719	3,310-4,382
Helicopter Operations (1,000's operations)	24,221-47,322	2,297-4,444	595-1,174	574-1,111	676-1,287	888-1,738	28,710-55,605

[1] Refer to **Figure 3-1**.

[2] Subareas totals may not add up to the planning area total because of rounding.

[3] 100% of gas is assumed to be piped.

[4] Tankering is forecasted to occur only in water depths >1,600 m.

[5] Projected length of pipelines does not include length in State waters.

NA = not available.

Table 3-4

Offshore Scenario Information Related to OCS Program Activities in the Central Planning Area for 2012-2051

	Offshore Subareas[1]						Total CPA[2]
	0-60 m	60-200 m	200-800 m	800-1,600 m	1,600-2,400 m	>2,400 m	
Wells Drilled							
Exploration and Delineation Wells	2,230-3,160	820-1,160	700-1,030	540-730	700-940	730-1,090	5,720-8,110
Development and Production Wells	2,760-3,900	1,020-1,440	860-1,270	670-900	870-1,160	900-1,350	7,080-10,020
Producing Oil Wells	446-592	188-240	534-775	449-592	609-796	575-848	2,801-3,843
Producing Gas Wells	2,034-2,918	722-1,050	236-365	151-218	171-244	235-362	3,549-5,157
Production Structures							
Installed	990-1,390	90-130	20-30	20-25	30	30-35	1,180-1,640
Removed Using Explosives	650-920	55-83	2-3	0	0	0	707-1,006
Total Removed	890-1,260	80-120	18-26	16-21	21-27	21-31	1,046-1,485
Method of Transportation[3]							
Percent Piped	>99%	>99%	>99%	>99%	90->99%		93->99%
Percent Barged	<1%	0%	0%	0%	0%		>1%
Percent Tankered[4]	0%	0%	0%	0%	0-10%		0-6%
Length of Installed Pipelines (km)[5]	8,515-16,993	NA	NA	NA	NA	NA	25,204-57,177
Service-Vessel Trips (1,000's round trips)	1,117-1,570	161-230	85-126	371-469	546-569	549-663	2,829-3,627
Helicopter Operations (1,000's operations)	19,975-37,825	1,902-3,560	404-801	404-668	595-801	595-890	23,780-44,500

[1] Refer to **Figure 3-1**.

[2] Subareas totals may not add up to the planning area total because of rounding.

[3] 100% of gas is assumed to be piped.

[4] Tankering is forecasted to occur only in water depths >1,600 m.

[5] Projected length of pipelines does not include length in State waters.

NA = not available.

Table 3-5

Annual Volume of Produced Water Discharged by Depth
(millions of bbl)

Year	Shelf 0-60 m	Shelf 60-200 m	Slope 200-400 m	Deepwater 400-800 m	Deepwater 800-1,600 m	Ultra-Deepwater 1,601-2,400 m	Ultra-Deepwater >2,400 m	Total
2000	370.6	193.1	35.5	25.6	12.2	0.0	0.0	637.0
2001	364.2	185.2	35.0	32.0	16.6	0.0	0.0	633.0
2002	344.6	180.4	32.5	35.2	21.4	0.0	0.0	614.1
2003	359.4	182.9	31.2	39.0	35.5	0.2	0.0	648.2
2004	346.7	160.5	29.3	36.9	39.2	1.8	0.0	614.4
2005	270.0	113.5	23.1	33.5	43.0	5.8	0.0	488.9
2006	260.3	99.6	20.6	35.0	61.6	12.4	0.0	489.5
2007	307.0	139. 3	22.2	40.0	70.6	15.5	0.1	594.7
2008	252.7	118.6	15.9	32.7	60.2	16.1	0.1	496.3
2009	265.2	109.2	19.9	39.2	65.6	25.0	0.1	524.2
2010	278.4	115.7	20.9	40.7	56.8	32.5	0.1	545.1
2011	273.7	117.0	20.7	39.7	67.7	32.2	0.1	551.1
2012	240.8	108.9	20.8	35.0	71. 5	32.3	0.1	509.4
2013	248.8	104.2	20.0	33.1	76.0	36.9	0.3	519.3
2014	248.7	97.2	18.5	35.7	79.3	50	1.0	530.4
2015	243.9	102.1	15.0	40.8	83.3	50.6	1.3	537.0

Source: Gravois, official communication, 2016.

Table 4-1

Unusual Mortality Event Cetacean Data for the Northern Gulf of Mexico

Cetaceans Stranded	Phase of Oil-Spill Response	Dates
89 cetaceans stranded	Prior to the response phase for the oil spill	March 1, 2010-April 29, 2010
119 cetaceans stranded or were reported dead offshore	During the initial response phase to the oil spill	April 30, 2010-November 2, 2010
933 cetaceans stranded*	After the initial response phase ended	November 3, 2010-July 31, 2014**

Note: Numbers are preliminary and may be subject to change. As of May 26, 2016, the unusual mortality event involves 1,141 cetacean "strandings" in the northern Gulf of Mexico (5% stranded alive and 95% stranded dead) (USDOC, NMFS, 2016).

* This number includes 15 dolphins that were killed incidental to fish-related scientific data collection and 1 dolphin that was killed incidental to trawl relocation for a dredging project.

** The initial response phase ended for all four states on November 2, 2010, but then reopened for eastern and central Louisiana on December 3, 2010, and then closed again on May 25, 2011.

Table 4-2

Recreational and Tourism Employment and Value-Added in BOEM's Economic Impact Areas in 2013

Economic Impact Area (EIA)	Recreational Employment	Recreational Value-Added	Tourism Employment	Tourism Value-Added
TX-1	68,769	2,596,402,975	19,081	1,203,931,388
TX-2	48,362	1,868,401,512	15,225	739,484,187
TX-3	366,048	15,331,216,510	123,709	8,466,549,982
TX-4	5,033	188,869,415	1,227	100,190,697
TX-5	18,829	709,291,174	4,763	395,566,972
TX-6	1,417	53,257,782	387	23,864,658
LA-1	14,399	683,645,908	6,149	293,572,508
LA-2	2,799	105,494,355	775	46,049,357
LA-3	32,869	1,315,185,525	9,639	566,173,408
LA-4	17,725	788,255,437	6,269	274,186,740
LA-5	50,188	2,028,801,718	14,122	975,127,188
LA-6	89,036	4,458,755,918	34,493	1,976,234,240
LA-7	23,637	948,326,917	6,577	379,903,898
MS-1	33,103	1,560,781,492	14,167	545,645,437
MS-2	1,475	54,100,278	391	19,098,912
AL-1	37,649	1,274,887,170	10,477	681,999,085
AL-2	3,483	120,034,728	873	73,873,691
FL-1	72,212	2,756,594,208	24,852	1,233,121,800
FL-2	31,357	1,173,072,208	10,300	445,046,333
FL-3	7,954	278,409,013	2,438	114,397,442
FL-4	67,758	2,497,491,474	18,301	1,153,527,693
FL-5	254,735	11,239,013,764	80,319	4,948,465,196
FL-6	115,642	5,472,107,011	45,683	2,263,684,576
Texas EIAs	508,457	20,747,439,369	164,393	10,929,587,884
Louisiana EIAs	230,653	10,328,465,778	78,023	4,511,247,338
Mississippi EIAs	34,578	1,614,881,770	14,558	564,744,348
Alabama EIAs	41,132	1,394,921,898	11,349	755,872,776
Florida EIAs	549,658	23,416,687,679	181,891	10,158,243,038
All EIAs	1,364,478	57,502,396,493	450,215	26,919,695,385

Sources: Eastern Research Group (2014) and IMPLAN Group LLC (2015).

Table 4-3

Economic and Demographic Information for BOEM's Economic Impact Areas in 2015

	Economic Variables				Demographic Variables						
EIA	Population	Employment	Gross Regional Product*	Income Per Capita	Median Age	Male Percent	White	Black	Hispanic	Native American	Asian
TX-1	1,713,140	752,177	45,961,422	32,038	32.2	49.0%	7.4%	0.5%	91.1%	0.1%	0.9%
TX-2	757,829	440,230	40,665,099	38,469	39.3	50.0%	37.8%	4.9%	55.4%	0.3%	1.6%
TX-3	6,340,375	3,897,727	433,804,883	48,201	35.9	49.8%	37.1%	17.1%	37.5%	0.3%	7.9%
TX-4	163,193	59,934	4,119,292	35,597	40.2	49.5%	75.9%	9.0%	13.9%	0.4%	0.7%
TX-5	374,402	205,831	18,218,742	41,889	37.1	50.9%	53.7%	25.9%	17.0%	0.4%	3.0%
TX-6	50,558	22,415	1,388,043	30,964	41.6	50.0%	74.6%	18.4%	5.8%	0.5%	0.7%
LA-1	204,559	119,065	10,819,182	36,778	38.5	48.8%	70.2%	24.9%	3.0%	0.5%	1.4%
LA-2	89,805	41,414	4,077,567	35,581	34.1	52.0%	75.1%	14.5%	7.2%	1.3%	1.8%
LA-3	588,935	337,248	34,334,083	34,397	36.7	49.2%	68.5%	26.7%	3.1%	0.5%	1.2%
LA-4	364,662	219,030	23,652,206	41,208	37.6	49.3%	67.4%	23.4%	4.6%	3.0%	1.6%
LA-5	858,991	533,746	49,605,913	37,132	37.3	48.7%	56.6%	37.0%	4.0%	0.3%	2.2%
LA-6	934,399	612,228	59,338,051	38,990	36.3	48.5%	46.3%	39.8%	9.9%	0.4%	3.7%
LA-7	425,178	207,007	16,064,830	35,795	38.4	48.7%	73.8%	19.9%	4.6%	0.4%	1.2%
MS-1	442,571	230,577	16,142,025	32,617	39.2	49.5%	71.4%	20.6%	5.1%	0.5%	2.5%
MS-2	68,605	21,814	1,132,099	25,130	38.2	52.1%	79.7%	18.0%	1.6%	0.4%	0.3%
AL-1	620,990	338,439	22,529,209	34,669	40.0	48.2%	66.7%	27.3%	3.4%	0.9%	1.8%
AL-2	115,636	51,498	3,406,314	29,539	42.2	49.2%	57.7%	37.5%	1.6%	2.8%	0.4%
FL-1	913,655	499,506	34,545,257	37,887	39.2	50.4%	75.8%	14.1%	6.2%	0.8%	3.1%
FL-2	513,271	273,299	18,167,329	27,898	40.4	50.8%	61.9%	29.5%	5.9%	0.5%	2.2%
FL-3	237,107	89,044	5,422,707	25,750	41.3	54.5%	70.5%	22.0%	6.3%	0.5%	0.8%
FL-4	1,436,702	604,746	36,362,418	31,692	48.6	48.7%	75.7%	11.2%	10.2%	0.3%	2.5%
FL-5	4,151,943	2,229,968	164,060,192	40,530	45.4	48.6%	67.0%	11.9%	17.6%	0.3%	3.2%
FL-6	1,495,975	752,134	47,563,571	36,586	45.5	49.8%	68.4%	7.9%	21.8%	0.3%	1.5%

*Gross Regional Product is presented in thousands of dollars.
Source: Woods & Poole Economics, Inc., 2015.

Table 4-4

Economic and Demographic Information for BOEM's Economic Impact Areas in 2050

	Economic Variables				Demographic Variables						
EIA	Population	Employment	Gross Regional Product	Income Per Capita	Median Age	Male Percent	White	Black	Hispanic	Native American	Asian
TX-1	3,211,678	1,510,514	122,978,193	53,332	37.1	49.6%	3.9%	0.5%	94.8%	0.0%	0.8%
TX-2	901,108	594,209	74,012,799	63,066	39.3	50.9%	26.1%	6.4%	64.8%	0.3%	2.5%
TX-3	11,318,207	7,262,133	1,095,629,086	71,185	37.7	50.1%	18.8%	14.1%	53.8%	0.2%	13.0%
TX-4	244,211	93,227	7,722,339	52,521	41.2	49.8%	61.6%	10.3%	26.3%	0.5%	1.4%
TX-5	407,234	257,973	29,621,937	60,544	40.4	53.4%	32.9%	23.2%	40.0%	0.3%	3.5%
TX-6	63,947	34,006	2,596,031	46,265	40.6	49.9%	52.4%	30.0%	15.5%	0.6%	1.4%
LA-1	248,184	158,977	18,087,099	51,816	40.5	48.8%	65.3%	26.8%	4.9%	0.7%	2.3%
LA-2	108,507	56,413	7,166,445	54,645	35.8	51.3%	68.3%	15.5%	12.1%	1.5%	2.6%
LA-3	776,541	522,500	71,038,683	52,350	40.2	49.5%	62.4%	30.6%	4.9%	0.5%	1.6%
LA-4	428,273	322,607	46,645,705	64,164	41.5	49.6%	56.0%	26.2%	11.3%	3.6%	3.0%
LA-5	1,253,207	823,740	94,931,543	54,332	42.7	49.2%	49.4%	41.3%	6.1%	0.3%	3.0%
LA-6	924,191	755,835	94,351,565	56,896	39.5	49.3%	32.7%	42.0%	19.6%	0.4%	5.3%
LA-7	647,551	335,006	34,109,728	51,203	41.5	48.5%	64.4%	23.5%	9.6%	0.4%	2.0%
MS-1	527,738	298,996	21,694,991	46,692	41.0	49.2%	63.0%	24.4%	9.3%	0.4%	2.8%
MS-2	87,917	28,786	1,880,313	36,234	41.1	53.1%	72.0%	24.9%	2.4%	0.3%	0.4%
AL-1	840,489	525,223	43,583,841	50,977	41.9	47.9%	61.7%	28.6%	6.2%	0.8%	2.7%
AL-2	116,672	66,584	5,802,458	45,800	46.3	50.7%	45.4%	46.6%	2.9%	4.2%	0.9%
FL-1	1,271,987	756,445	67,816,779	55,604	42.5	51.9%	69.3%	16.9%	9.3%	0.6%	3.9%
FL-2	721,561	396,668	33,967,696	38,977	45.2	52.1%	53.3%	37.6%	5.9%	0.4%	2.8%
FL-3	335,944	132,391	10,488,863	36,453	44.1	56.4%	64.1%	26.4%	7.9%	0.4%	1.2%
FL-4	2,445,932	1,050,736	78,635,995	47,113	52.0	50.3%	69.2%	12.7%	14.7%	0.3%	3.1%
FL-5	6,237,613	3,589,267	365,775,112	63,788	45.0	49.5%	45.3%	14.1%	34.0%	0.2%	6.4%
FL-6	2,465,544	1,320,017	117,042,429	57,573	47.0	51.0%	50.9%	7.4%	40.0%	0.2%	1.5%

*Gross Regional Product is presented in thousands of dollars.
Source: Woods & Poole Economics, Inc., 2015.

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APPENDIX A

MEMORANDUM OF AGREEMENT
BETWEEN THE BUREAU OF OCEAN ENERGY MANAGEMENT
AND THE NATIONAL PARK SERVICE

MEMORANDUM OF AGREEMENT BETWEEN THE BUREAU OF OCEAN ENERGY MANAGEMENT GULF OF MEXICO OCS REGION AND THE NATIONAL PARK SERVICE SOUTHEAST REGION DURING COMPLETION OF THE SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR OUTER CONTINENTAL SHELF OIL AND GAS PROPOSED CENTRAL PLANNING AREA LEASE SALE 247 IN THE GULF OF MEXICO

INTRODUCTION

The Bureau of Ocean Energy Management (BOEM) is preparing a Supplemental Environmental Impact Statement (EIS) for Outer Continental Shelf (OCS) oil and gas proposed Central Planning Area (CPA) Lease Sale 247 (CPA 247 Supplemental EIS). On August 17, 2015, a Notice of Intent to prepare this Supplemental EIS was published in the *Federal Register* for initial scoping and identification of scheduled scoping meetings.

Section 1501.6 of the Council on Environmental Quality's regulations emphasizes agency cooperation in the National Environmental Policy Act (NEPA) process between Federal agencies either having overlapping jurisdiction or special expertise related to a proposed action. The National Park Service (NPS) requested to be a cooperating agency on this Supplement EIS and BOEM has agreed to accept their request.

This Memorandum of Agreement (MOA) outlines the responsibilities of BOEM and NPS for this Supplemental EIS project. It is designed to establish expectations between the two agencies that apply for the duration of the CPA 247 Supplemental EIS, whereupon it terminates. Executing this MOA does not satisfy NPS's independent review and comment responsibilities under Section 102(2)(C) of NEPA or its responsibilities for any other environmental consultations required by law. This MOA does not affect BOEM's responsibilities under the Outer Continental Shelf Lands Act and regulations under 30 CFR part 250.

BOEM RESPONSIBILITIES

(1) BOEM shall designate a primary point of contact (POC) for matters related to this MOA. Gary Goeke is the POC for the Gulf of Mexico OCS Region.

(2) BOEM shall have the lead in setting up and holding public meetings for the Draft Supplemental EIS.

(3) BOEM shall provide NPS a copy and summary of pertinent comments received during preparation of this Supplemental EIS (including scoping and Draft Supplemental EIS public comment periods, Final Supplemental EIS, and Record of Decision).

(4) BOEM shall place a copy of this MOA in an appendix to this Supplemental EIS.

(5) BOEM shall provide NPS with early versions of relevant Draft Supplemental EIS chapters, as arranged between the BOEM and NPS Points of Contact.

(6) BOEM shall provide NPS with a preliminary copy of the Final Supplemental EIS for review prior to final lead agency approval and distribution of the document.

(7) BOEM shall respond to all comments received from NPS.

NPS RESPONSIBILITIES

(1) NPS shall provide applicable data and information regarding their expertise on potential impacts to the Gulf Islands National Seashore and the experience of park visitors.

(2) NPS shall designate a primary POC to represent NPS in matters related to this MOA. The NPS's Point of Contact is Bryan Faehner, Energy and Environmental Protection Specialist for the Southeast Region.

(3) NPS shall comply with BOEM's Supplemental EIS preparation schedule for all solicited inputs and review periods, including administrative reviews.

(4) NPS shall be responsible for any expenses incurred by NPS related to this MOA.

TERMINATION

This MOA may be terminated by written notice by either of the below signatories at any time. This MOA terminates at the conclusion of the CPA 247 Supplemental EIS.

LIMITATIONS

All commitments made in this MOA are subject to the availability of appropriated funds and each agency's budget priorities. Nothing in this MOA obligates BOEM or NPS to expend appropriations or to enter into any contract, assistance agreement, interagency agreement, or incur other financial obligations. This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the parties to this MOA will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate subsidiary agreements that will be effected in writing by representatives of both parties. This MOA does not create any right or benefit enforceable against BOEM or NPS, their officers or employees, or any other person. This MOA does not apply to any person outside BOEM and NPS.

RESOLUTION OF DISPUTES

The parties agree to make every attempt to settle any disputes regarding this MOA at the lowest operational level. In the case of a substantial disagreement between BOEM and NPS, each agency will designate a senior management official at the regional level to seek resolution.

If these officials do not resolve the dispute within 30 days, the agencies will further elevate the matter to the Director of BOEM and the Director of NPS for prompt resolution.

PREDECISIONAL MATERIALS

The undersigned hereby agree to maintain confidentiality of information and documents shared in furtherance of this MOA during completion of this Supplemental EIS. This agreement applies to all communications, including the following: email messages; notes to the file; agendas, pre-meeting materials, presentations, and meeting notes, or summaries; letters; review evaluations; and all documents created and shared as part of the collaboration established in this MOA. The parties have the right to expressly waive any privilege with regard to such documents and may do so by advising the other party in writing of its decision to waive the privilege.

Michael A. Celata
Acting Regional Director
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

10/23/15
Date

FOR Stan Austin
Regional Director
National Park Service
Southeast Region

11·9·15
Date

APPENDIX B

CATASTROPHIC SPILL EVENT ANALYSIS: HIGH-VOLUME, EXTENDED-DURATION OIL SPILL RESULTING FROM LOSS OF WELL CONTROL ON THE GULF OF MEXICO OUTER CONTINENTAL SHELF

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B. CATASTROPHIC SPILL EVENT ANALYSIS: HIGH-VOLUME, EXTENDED-DURATION OIL SPILL RESULTING FROM LOSS OF WELL CONTROL ON THE GULF OF MEXICO OUTER CONTINENTAL SHELF

B.1. INTRODUCTION

In 1986, the Council on Environmental Quality (CEQ) regulations were amended to rescind the requirement to prepare a "worst-case analysis" for an environmental impact statement (EIS) (refer to 40 CFR § 1502.22(b)(4)). The regulation, as amended, states that catastrophic, low-probability impacts must be analyzed if the analysis is "supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason."

The August 16, 2010, CEQ report, prepared following the *Deepwater Horizon* explosion, oil spill, and response in the Gulf of Mexico, recommended that the Bureau of Ocean Energy Management (BOEM), formerly the Minerals Management Service (MMS) and Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), should "ensure that National Environmental Policy Act (NEPA) documents provide decisionmakers with a robust analysis of reasonably foreseeable impacts, including an analysis of reasonably foreseeable impacts associated with low-probability catastrophic spills for oil and gas activities on the Outer Continental Shelf" (CEQ, 2010). This evaluation is a robust analysis of the impacts from low-probability catastrophic spills and will be made available to all applicable decisionmakers including, but not limited to, the Secretary of the Department of the Interior (USDOI) for the National Five-Year Program, the Assistant Secretary of Land and Minerals Management for an oil and gas lease sale, and the Regional Supervisors of the Gulf of Mexico OCS Region's Office of Environment and Office of Leasing and Plans.

It should be noted that the analysis presented here is intended to be a general overview of the potential effects of a catastrophic spill in the Gulf of Mexico. As such, the *Catastrophic Spill Event Analysis* should be read with the understanding that further detail about accidental oil impacts on a particular resource may be found in the analysis in this Supplemental EIS or the analyses in the "prior 2012-2017 Gulf of Mexico EISs": *Gulf of Mexico OCS Oil and Gas Lease Sales: 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; Central Planning Area Lease Sales 227, 231, 235, 241, and 247, Final Environmental Impact Statement* (2012-2017 WPA/CPA Multisale EIS; USDOI, BOEM, 2012); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231, Final Supplemental Environmental Impact Statement* (WPA 233/CPA 231 Supplemental EIS; USDOI, BOEM, 2013a); *Gulf of Mexico OCS Oil and Gas Lease Sales: 2015-2017; Central Planning Area Lease Sales 235, 241, and 247, Final Supplemental Environmental Impact Statement* (CPA 235/241/247 Supplemental EIS, USDOI, BOEM, 2014a); and *Gulf of Mexico OCS Oil and Gas Lease Sales: 2016 and 2017; Central Planning Area Lease Sales 241 and 247; Eastern Planning Area Lease Sale 226, Final Supplemental Environmental Impact Statement* (CPA 241/247 and EPA 226 Supplemental EIS; USDOI, BOEM, 2015).

B.1.1. What is a Catastrophic Event?

As applicable to NEPA, Eccleston (2008) defines a catastrophic event as "large-scale damage involving destruction of species, ecosystems, infrastructure, or property with long-term effects, and/or major loss of human life." For oil and gas activities on the Outer Continental Shelf (OCS), a catastrophic event is a high-volume, extended-duration oil spill regardless of the cause, whether natural disaster (i.e., hurricane) or manmade (i.e., human error and terrorism). This high-volume, extended-duration oil spill, or catastrophic spill, has been further defined by the National Oil and Hazardous Substances Pollution Contingency Plan as a "spill of national significance" or "a spill which, because of its severity, size, location, actual or potential impact on the public health and welfare or the environment, or the necessary response effort, is so complex that it requires extraordinary coordination of federal, state, local, and responsible party resources to contain and cleanup the discharge" (40 CFR part 300, Appendix E).

Each oil-spill event is unique; its outcome depends on several factors, including time of year and location of release relative to winds, currents, land, and sensitive resources; specifics of the well (i.e.,

flow rates, hydrocarbon characteristics, and infrastructure damage); and response effort (i.e., speed and effectiveness). For this reason, the severity of impacts from an oil spill cannot be predicted based on volume alone, although a minimum volume of oil must be spilled to reach catastrophic impacts.

Though large spills may result from a pipeline rupture, such events will not result in a catastrophic spill because the ability to detect leaks and shut off pipelines limits the amount of the spill to the contents of the pipeline. The largest, non-blowout-related spill on the Gulf of Mexico OCS occurred in 1967, a result of internal pipeline corrosion following initial damage by an anchor. In 13 days, 160,638 barrels (bbl) of oil leaked (USDOI, BSEE, 2015); however, no significant environmental impacts were recorded as a result of this spill.

Although loss of well control is defined as the uncontrolled flow of reservoir fluid that may result in the release of gas, condensate, oil, drilling fluids, sand, or water, it is a broad term that includes very minor well control incidents as well as the most severe well control incidents. Historically, loss of well control incidents occurred during development drilling operations, but loss of well control incidents can occur during exploratory drilling, production, well completions, or workover operations. These losses of well control incidents may occur between formations penetrated in the wellbore or at the seafloor.

Prior to the *Deepwater Horizon* explosion, oil spill, and response, the two largest spills resulting from a loss of well control in U.S. waters of the Gulf of Mexico occurred in 1970 and released 30,000 and 53,000 bbl of oil, respectively (USDOI, BSEE, 2015). These incidents resulted in four human fatalities. Although these incidents occurred only 8-14 miles (mi) (13-26 kilometers [km]) from shore, there was minor shoreline contact with oil (USDOC, NOAA, Office of Response and Restoration, 2010a and 2010b). In 1987, a blowout of the Mexican exploratory oil well, YUM II, resulted in a spill of 58,640 bbl and 75 mi (121 km) of impacted shoreline (USDOC, NOAA, Hazardous Materials Response and Assessment Division, 1992). However, none of these spills met the previously described definitions of a catastrophic event or spill.

A blowout is a more severe loss of well control incident that creates a greater risk of a large oil spill and serious human injury. Two blowouts that resulted in catastrophic spills have occurred in U.S. and Mexican waters of the Gulf of Mexico. On June 3, 1979, the *Ixtoc I* well blowout in shallow water (water depth of 164 feet [ft] [50 meters [m]] and 50 mi [80 km] offshore in the Bay of Campeche, Mexico) spilled 3.5 million barrels (MMbbl) of oil in 10 months (USDOC, NOAA, Office of Response and Restoration, 2010c; USDOC, NOAA, Hazardous Materials Response and Assessment Division, 1992; ERCO, 1982). On April 20, 2010, the *Macondo* well blowout (*Deepwater Horizon* explosion, oil spill, and response) in deep water (4,992 ft; 1,522 m) 48 mi (77 km) offshore in Mississippi Canyon Block 252, spilled an estimated 4.9 MMbbl of oil until it was capped approximately 3 months later. Due to being classified as catastrophic, the *Ixtoc I* and *Macondo* well blowouts and spills were utilized to develop the catastrophic spill event scenario in this analysis.

B.1.2. Methodology

Two general approaches are utilized to analyze a catastrophic event under NEPA. The first approach is a bounding analysis for each individual resource category (e.g., marine mammals and sea turtles). A bounding analysis involves selecting and evaluating a different set of factors and scenarios for each resource in the context of a worst-case analysis. The second approach involves the selection of a single set of key circumstances that, when combined, result in catastrophic consequences. The second approach is used for a site-specific analysis and, consequently, its possible application is more limited. Accordingly, this analysis combines the two approaches, relying on a generalized scenario while identifying site-specific severity factors for individual resources. This combined approach allows for the scientific investigation of a range of possible, although not necessarily probable, consequences of a catastrophic blowout and oil spill in the Gulf of Mexico.

B.1.2.1. Geographic Scope

The Gulf of Mexico is a semi-enclosed basin with an extensive history of oil and gas activities and unique environmental conditions and hydrocarbon reservoir properties; consequently, this analysis is only applicable to the Gulf of Mexico OCS and is not intended for other OCS regions.

B.1.2.2. Impact-Producing Factors and Scenario

A hypothetical, yet feasible, scenario (**Chapter B.2**) was developed to provide a framework for identifying the impacts of an extended oil spill from an uncontrolled blowout. Unless noted, this scenario is based on the large magnitude, blowout-related oil spills that have occurred in the Gulf of Mexico, i.e., *Ixtoc I* and *Macondo* well blowouts and spills (discussed in **Chapter B.1.1**). As noted above, because each spill event is unique, its outcome depends on many factors. Therefore, the specific impacts from future spills cannot be predicted based on this scenario.

B.1.2.3. OSRA Catastrophic Run

A special Oil-Spill Risk Analysis (OSRA) model run was conducted to estimate the impacts of a possible future catastrophic or high-volume, extended-duration oil spill. This analysis emphasized modeling a spill that continued for 90 consecutive days by launching spills on each of 90 consecutive days, with each trajectory tracked for up to 60 days. The OSRA was conducted for only the trajectories of oil spills from hypothetical spill locations to various onshore and offshore environmental resources. Data from three hypothetical spill locations located in the Central Planning Area (CPA) and two hypothetical spill locations located in the Eastern Planning Area (EPA) were included and are intended for use as examples of this type of exercise (**Figure B-1**). Information on previous catastrophic OSRA runs for the CPA can be found in Appendix C of the CPA 235/241/247 Supplemental EIS and 2012-2017 WPA/CPA Multisale EIS.

The probability of an oil spill contacting a specific resource within a given time of travel from a spill point is termed a conditional probability; the condition being that a spill is assumed to have occurred. Each trajectory was allowed to continue for as long as 60 days. However, once a hypothetical spill contacts land, the spill trajectory is terminated, and the contact is recorded. Although, overall OSRA is designed for use as a risk-based assessment, for this analysis, only the conditional probability, the probability of contact to the resource, was calculated. The probability of a catastrophic spill occurring was not calculated; thus, the combination of the probability of a spill and the probability of contact to the resources from the hypothetical spill locations were not calculated. Results from this trajectory analysis provide input to the final product by estimating where spills might travel on the ocean's surface and what environmental resources might be contacted if and when another catastrophic spill occurs, but it does not provide input on the probability of another catastrophic spill occurring. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

B.1.2.4. Environmental and Socioeconomic Impacts

This analysis evaluates the impacts to the Gulf of Mexico's biological, physical, and socioeconomic resources from a catastrophic blowout, oil spill, and associated cleanup activities.

Although the most recent EISs prepared by this Agency for oil and gas lease sales in the Gulf of Mexico analyze the potential impacts from smaller oil spills that are more reasonably foreseeable (USDOI, MMS, 2007 and 2008), this analysis focuses on the most likely and most significant impacts created by a high-volume, extended-duration spill. Because catastrophic consequences may not occur for all resources, factors affecting the severity of impacts are identified by the individual resource.

B.1.3. How to Use This Analysis

The purpose of this technical analysis is to assist BOEM in meeting CEQ requirements that require a discussion of impacts from catastrophic events. This analysis, based on credible scientific evidence, identifies the most likely and most significant impacts from a high-volume blowout and oil spill that continues for an extended period of time. The scenario and impacts discussed in **Chapters B.2 and B.3** should not be confused with the scenario and impacts anticipated to result from routine activities or the more reasonably foreseeable accidental events of the CPA proposed action.

Chapter B.2 is intended to clearly describe the scenario presented for all four phases of a catastrophic blowout event and identify the impact-producing factors associated with each phase. **Chapter B.3** is intended to analyze the impacts of each phase of a catastrophic blowout on various environmental resources. These chapters can be used to differentiate the conditions of a catastrophic spill from the routine activities and accidental events described in this Supplemental EIS.

This technical analysis is designed to be incorporated by reference in future NEPA documents and consultations. Therefore, factors that affect the severity of impacts of a high-volume, extended-duration spill on individual resources are highlighted for use in subsequent site-specific analyses.

To analyze a hypothetical catastrophic event in an area such as the Gulf of Mexico, several assumptions and generalizations were made. However, future project-specific analyses should also consider specific details such as potential flow rates for the specific proposed activity, the properties of the targeted reservoir, and the proximity to environmental resources of the proposed activities.

B.2. IMPACT-PRODUCING FACTORS AND SCENARIO (PHASES 1-4)

For the purposes of this analysis, an event similar to the *Ixtoc I* well blowout and spill that occurred in 1979 in 160-ft (50-m) water depth will be used as the basis for a shallow water spill and an event similar to the *Macondo* well blowout and spill that occurred in 2010 in the Mississippi Canyon area in 5,000-ft (1,524-m) water depth will be used to represent a deepwater spill.

B.2.1. Phase 1—Initial Event

Phase 1 of the scenario is the initiation of a catastrophic blowout incident. While most of the environmental and socioeconomic impacts of a catastrophic blowout would occur during the ensuing high-volume, extended-duration spill (refer to **Chapter B.3**), it is important to acknowledge the deadly events that could occur in the initial phase of a catastrophic blowout. The following scenario was developed to provide a framework for identifying the most likely and most significant impacts during the initial phase.

Impacts, response, and intervention depend on the spatial location of the blowout and release. While there are several points where a blowout could occur, four major distinctions that are important to the analysis of impacts are described in **Table B-1**.

For this analysis, an explosion and subsequent fire are assumed to occur. If a blowout associated with the drilling of a single exploratory well occurs, a fire could result that would burn for 1 or 2 days. If a blowout occurs on a production platform, other wells could feed the fire, allowing it to burn for over a month (USDOC, NOAA, Office of Response and Restoration, 2010b). The drilling rig or platform may sink. If the blowout occurs in shallow water, the sinking rig or platform may land in the immediate vicinity; if the blowout occurs in deep water, the rig or platform could land a great distance away, beyond avoidance zones. For example, when the drilling rig *Deepwater Horizon* sank, it landed 1,500 ft (457 m) away on the seafloor. Regardless of water depth, the immediate response would be from search and rescue vessels and aircraft, such as U.S. Coast Guard (USCG) cutters, helicopters, and rescue planes.

B.2.2. Phase 2—Offshore Spill

Phase 2 of the analysis focuses on the spill and response in Federal and State offshore waters.

B.2.2.1. Duration of Spill

The duration of the offshore spill from a blowout depends on the time needed for intervention and the time the remaining oil persists offshore. If a blowout occurs and the damaged surface facilities preclude well reentry operations, a relief well may be needed to regain control. The time required to drill the relief well depends on the complexity of the intervention, the location of a suitable rig, the type of operation that must be terminated to release the rig (e.g., casing may need to be run before releasing the rig), and the logistics in mobilizing personnel and equipment to the location. A blown-out well may also be successfully capped prior to completion of relief wells, as occurred in the *Macondo* well blowout. In terms of persistence of spilled oil on surface waters, oil from the *Macondo* well blowout did not persist for more than 30 days (OSAT, 2010). However, based on BOEM's weathering modeling (refer to Appendix C of the CPA 235/241/247 Supplemental EIS), it is assumed that oil could persist on surface waters for as long as 1-2 months, depending on the season and year.

B.2.2.1.1. Shallow Water

If a blowout occurs in shallow water, it is estimated that the entire well intervention effort including drilling relief wells, if deemed necessary, could take 2 weeks to 3 months. This estimate would include 1-3 weeks to transport the drilling rig to the well site. Spilled surface oil is not expected to persist more than 1-2 months (depending upon the season and environmental conditions) after the flow is stopped. Spilled oil is more likely to persist in the offshore environment during colder weather and during wind and hydrodynamic conditions that keep the oil offshore. Therefore, the estimated spill duration resulting from a shallow water blowout is 1½-5 months (approximately 2 weeks to 3 months for active spillage and 1-2 months for oil persistence in the environment).

B.2.2.1.2. Deep Water

If a blowout occurs in deep water, it is estimated that it would take 2-4 weeks to remove debris and to install a capping stack or a cap and flow system on a well, if conditions allow this type of intervention. The entire intervention effort, if it required drilling relief wells, could take 3-4 months (USDOI, MMS, 2000; Regg, 2000). This includes 2-4 weeks to transport the drilling rig to the well site. Spilled surface oil is not expected to persist more than 1-2 months (depending upon the season and environmental conditions) after the flow is stopped. Spilled oil is more likely to persist in the offshore environment during colder weather and during wind and hydrodynamic conditions that keep the oil offshore. Therefore, the estimated spill duration from a deepwater blowout is 1½-6 months (approximately 2 weeks to 4 months for active spillage and 1-2 months for oil persistence in the environment).

B.2.2.2. Area of Spill

When oil reaches the sea surface, it spreads. The speed and extent of spreading depends on the type and volume of oil that is spilled. However, a catastrophic spill would likely spread to hundreds of square miles. Also, the oil slick may break into several smaller slicks, depending on local wind patterns that drive the surface currents in the spill area.

Subsurface oil observed during both the *Ixtoc I* and *Macondo* well blowouts and spills could also spread to significant distances depending on environmental conditions (such as hydrodynamics), oil chemistry and weathering, and the application of subsea dispersants or mechanical conditions at the release point that would diffuse the oil.

B.2.2.3. Volume of Spill

After 50 years of oil and gas exploration and development activity on the continental shelf of the Gulf of Mexico, most of the largest oil and natural gas reservoirs thought to exist in shallow-water areas of the GOM at drill depths less than 15,000 ft (4,572 m) subsea have been identified. Large undiscovered hydrocarbon reservoirs are still thought to exist in shallow-water areas. However, results taken from BOEM's most recent resource assessment study and a review of the more recent shallow-water drilling and leasing activity suggest that future discoveries of large reservoirs in the shallow-water areas of the GOM are likely to exist greater than 15,000 ft (4,572 m) below sea level where geologic conditions are more favorable for natural gas reservoirs to exist than oil reservoirs. In contrast to the shallow-water areas of the GOM where the discovery of a new, large, prolific oil reservoir is considered a low-probability event, the results from BOEM's resource assessment study pertaining to the deeper water areas of the GOM suggest that there is a high probability that many large oil and gas reservoirs have yet to be discovered in deep water. BOEM's forecast for deep water has support from other public and private sector resource studies. The forecast is also supported by the results of BOEM's analysis of deepwater leasing and drilling activity, which indicates that the industry is leasing acreage in deepwater areas of the GOM where large prospects can be identified and where the majority of exploration and development drilling activity targets potentially thick oil reservoirs capable of achieving the high production rates necessary to offset the high costs associated with deepwater oil development in the GOM.

B.2.2.3.1. Shallow Water

For this analysis, an uncontrolled flow rate of 30,000 bbl per day is assumed for a catastrophic blowout in shallow water. This assumption is based upon the results of well tests in shallow water and the maximum flow rate from the 1979 *Ixtoc I* well blowout, which occurred in shallow water. Using this flow rate, the total volume of oil spilled from a catastrophic blowout in shallow water is estimated at 900,000 bbl to 3 MMbbl from spillage occurring over 1-3 months. In addition to the flow rate, it is assumed that any remaining diesel fuel from a sunken drilling rig or platform would also leak.

B.2.2.3.2. Deep Water

For the purposes of this analysis, an uncontrolled flow rate of 30,000-60,000 bbl per day is assumed for a catastrophic blowout in deep water. This flow rate is based on the assumption in **Chapter B.2.2.3.1** above, well test results, and the maximum flow rate estimated for the *Macondo* well blowout and spill occurred in deep water. Therefore, the total volume of oil spilled is estimated to be 0.9-7.2 MMbbl over 1-4 months. In addition, deepwater drilling rigs or platforms hold a large amount of diesel fuel (10,000-20,000 bbl). Therefore, it is assumed that any remaining diesel fuel from a sunken structure would also leak and add to the spill.

B.2.2.4. Oil in the Environment: Properties and Persistence

The fate of oil in the environment depends on many factors, such as the source and composition of the oil, as well as its persistence (NRC, 2003). Persistence can be defined and measured in different ways (Davis et al., 2004), but the National Research Council (NRC) generally defines persistence as how long oil remains in the environment (NRC, 2003; page 89). Once oil enters the environment, it begins to change through physical, chemical, and biological weathering processes (NRC, 2003). These processes may interact and affect the properties and persistence of the oil through the following:

- evaporation (volatilization);
- emulsification (the formation of a mousse);
- dissolution;
- oxidation (including respiration); and
- transport processes (NRC, 2003; Scholz et al., 1999).

Horizontal transport takes place via spreading, advection, dispersion, and entrainment while vertical transport takes place via dispersion, entrainment, Langmuir circulation, sinking, overwashing, partitioning, and sedimentation (NRC, 2003). The persistence of an oil slick is influenced by the effectiveness of oil-spill response efforts and affects the resources needed for oil recovery (Davis et al., 2004). The persistence of an oil slick may also affect the severity of environmental impacts as a result of the spilled oil.

Crude oils are not a single chemical, but instead are complex mixtures with varied compositions. Thus, the behavior of the oil and the risk the oil poses to natural resources depends on the composition of the specific oil encountered (Michel, 1992). Generally, oils can be divided into three groups of compounds: (1) light-weight; (2) medium-weight; and (3) heavy-weight components. On average, these groups are characterized as outlined in **Table B-2**.

Of the oil reservoirs sampled in the Gulf of Mexico OCS, the majority fall within the light-weight category, while less than one quarter are considered medium-weight and a small portion are considered heavy-weight. Oil with an American Petroleum Institute (API) gravity of 10.0 or less would sink and has not been encountered in the Gulf of Mexico OCS; therefore, it is not analyzed in this Appendix (USDOI, BOEMRE, 2010a).

Heavy-weight oil may persist in the environment longer than the other two types of oil, but the medium-weight components within oil present the greatest risks to organisms because, with the exception of the alkanes, these medium-weight components are persistent, bioavailable, and toxic (Michel, 1992).

Previous studies (e.g., Johansen et al., 2001) supported the theory that most, if not all, released oil would reach the surface of the water column. However, data and observations from the *Macondo* well blowout and spill challenge that theory. While analyses are in their preliminary stages, it appears that measurable amounts of hydrocarbons (dispersed or otherwise) were detected in the water column as subsurface "plumes" and on the seafloor in the vicinity of the release. While not all of these hydrocarbons have been definitively traced back to releases from the *Macondo* well, these early measurements and results warrant a reassessment of previous theories of the ultimate fate of hydrocarbons from unintended subsurface releases. It is important to note that the North Sea experiment (Johansen et al., 2001) did not include the use of dispersants at or near the source of the subsea oil discharge.

B.2.2.5. Release of Natural Gas

The quality and quantity of components in natural gas vary widely by the field, reservoir, or location from which the natural gas is produced. Although there is not a "typical" makeup of natural gas, it is primarily composed of methane (NaturalGas.org, 2012). Thus, if natural gas were to leak into the environment, methane may be released into the environment. Limited research is available for the biogeochemistry of hydrocarbon gases in the marine environment (Patin, 1999, page 233). Theoretically, methane could stay in the marine environment for long periods of time (Patin, 1999, page 237) as methane is highly soluble in seawater at the high pressures and cold temperatures found in deepwater environments (NRC, 2003, page 108). Methane diffusing through the water column would likely be oxidized in the aerobic zone and would rarely reach the air-water interface (Mechalas, 1974, page 23). Methane is a carbon source and its introduction into the marine environment could result in diminished dissolved oxygen concentrations due to microbial degradation.

The *Macondo* well blowout and spill resulted in the emission of an estimated 9.14×10^9 to 1.29×10^{10} moles of methane from the wellhead (Kessler et al., 2011; Valentine et al., 2010) with maximum subsurface methane concentrations of 183-315 micromoles measured in May/June 2010 (Valentine et al., 2010; Joye et al., 2011). This methane release corresponded to a measurable decrease in oxygen in the subsurface plume due to respiration by a community of methanotrophic bacteria. During the *Macondo* well blowout and spill, methane and oxygen distributions were measured at 207 stations throughout the affected region (Kessler et al., 2011). Based on these measurements, it was concluded that within ~120 days from the onset of release $\sim 3.0 \times 10^{10}$ to 3.9×10^{10} moles of oxygen were respired, primarily by methanotrophs, and left behind a residual microbial community containing methanotrophic bacteria. The researchers further suggested that a vigorous deepwater bacterial bloom respired nearly all the released methane within this time and that by analogy, large-scale releases of methane from hydrates in the deep ocean are likely to be met by a similarly rapid methanotrophic response. However, hypoxic conditions were never reached (OSAT, 2010). Hypoxic conditions are generally agreed to occur when dissolved oxygen falls below 2 milligrams/liter (1.4 milliliter/liter) (OSAT, 2010). Note that methane released from the *Macondo* well blowout and spill was generally confined to the subsurface, with minimal amounts reaching the atmosphere (Kessler et al., 2011; Ryerson et al., 2011).

B.2.2.6. Deepwater Subsea Containment

The NTL 2010-N10 requires that offshore operators address containment system expectations to be able to rapidly contain a spill as a result of a loss of well control from a subsea well. This resulted in the development of rapid response containment systems that are available through either the Marine Well Containment Company or Helix Well Ops in the Gulf of Mexico. In addition, industry has a multitude of vendors available within the GOM region that can provide the services and supplies necessary for debris removal capability, dispersant injection capability, and top-hat deployment capability. Many of these vendors are already cited for use by the Marine Well Containment Company and Helix Well Ops. The Bureau of Safety and Environmental Enforcement (BSEE) has indicated to BOEM that it will not allow an operator to begin drilling operations until adequate subsea containment and collection equipment, as well as subsea dispersant capability, is determined by BSEE to be available to the operator and is sufficient for use in response to a potential incident from the proposed well(s).

Marine Well Containment Company

The Marine Well Containment Company's (MWCC's) containment system includes two modular capture vessels (MCVs); enhanced subsea umbilical, risers, and flowlines (SURF) equipment; three capping stacks; and additional ancillary equipment. The capping stack is uniquely designed to shut off the flow of fluid from the well or to provide a conduit to safely flow well fluids to the two MCVs. The processing equipment on the MCVs can separate sand and process liquids and gases flowed from a damaged subsea well. The MWCC Containment System is built for use in the deepwater U.S. Gulf of Mexico, defined as water depths from 500-1,000 ft to 10,000 ft (152-305 m to 3,048 m), in temperatures up to 350 °F (177 °C), and under pressure up to 15,000 pounds per square inch (psi). The MWCC's suite of containment equipment enables the company to mobilize and deploy the most appropriate well containment technology based upon the unique well control incident and equipment requirements. The system has the capacity to contain up to 100,000 bbl of liquid per day (4.2 million gallons/day) and handle up to 200 million standard cubic feet of gas per day. The containment system combines equipment from the company's previous interim containment system and the expanded containment system. This system is designed to fully contain oil flow in the event of a potential future underwater blowout and to address a variety of scenarios. It is envisioned that this system could be fully operational within days to weeks after a spill event occurs (MWCC, 2015).

The Marine Well Containment Company's SURF equipment, which is used to flow fluid from the capping stack to the MCVs, as well as to provide dispersant and hydrate mitigation injection, is staged in Theodore, Alabama. The MWCC houses, stores, and tests the processing equipment for the two MCVs, as well as its capping stacks in Ingleside, Texas. The companies that originated this system have formed a nonprofit organization, the Marine Well Containment Company, to operate and maintain the system (MWCC, 2015). The MWCC will provide fully trained crews to operate the system, will ensure the equipment is operational and ready for rapid response, and will conduct research on new containment technologies (MWCC, 2015).

In the summer of 2012, a full-scale deployment of MWCC's critical well-control equipment to exercise the oil and gas industry's response to a potential subsea blowout in the deepwater of the Gulf of Mexico was conducted by BSEE. The MWCC's 15,000-psi capping stack system, a 30-ft (9-m) tall, 100-ton piece of equipment similar to the one that stopped the flow of oil from the *Macondo* well following the *Deepwater Horizon* explosion in 2010, was successfully tested during this deployment drill. During this exercise, the capping stack was deployed from its storage location in Ingleside, Texas, to an area in the Gulf of Mexico nearly 200 mi (322 km) from shore. Once on site, the system was lowered to a simulated wellhead (a pre-set parking pile) on the ocean floor in nearly 7,000 ft (2,134 m) of water, connected to the wellhead, and then pressurized to 10,000 psi.

Helix Well Ops

Another option for source control and containment in the Gulf of Mexico is through Helix Well Ops. Helix Well Ops contracted the equipment that it found useful in the *Deepwater Horizon* explosion, oil spill, and response and offered it to oil and gas producers for use beginning January 1, 2011. This system focused on the utilization of the Helix Producer I and the Q4000 vessels. Each of these vessels played a role in the response to the *Deepwater Horizon* explosion and oil spill, and was continually working in the Gulf of Mexico. Helix Well Ops' system, which is referred to as the Helix Fast Response System (HFRS), currently has the ability to fully operate in up to 10,000 ft (3,048 m) of water and has intervention equipment to cap and contain a well with the mechanical integrity to be shut-in. The HFRS also has the ability to capture and process 57,000 bbl of oil per day, 72,000 bbl of liquid per day, and 120 million standard cubic feet per day at 10,000 psi (Helix Energy Solutions Group, 2014).

In April-May 2013, a full-scale deployment of Helix Well Ops' critical well-control equipment to exercise the oil and gas industry's response to a potential subsea blowout in the deep water of the Gulf of Mexico was conducted by BSEE. Helix Well Ops' capping stack system is a 20-ft (6-m) tall, 146,000 pound piece of equipment similar to the one that stopped the flow of oil from the *Macondo* well following the *Deepwater Horizon* explosion in 2010. It was successfully tested during this unannounced deployment drill. The capping stack was deployed from its storage location and once onsite, the system was lowered to a simulated wellhead (a pre-set parking pile) on the ocean floor in nearly 5,000 ft (1,524 m) of water, connected to the wellhead, and then pressurized to 8,400 psi.

B.2.2.7. Offshore Cleanup Activities

As demonstrated by the *Ixtoc I* and *Macondo* well blowouts and spills, a large-scale response effort is certain to follow a catastrophic blowout. The number of vessels and responders would steadily increase as the spill continued. In the event of a spill, particularly a loss of well control, there is no single method of containment and removal that would be 100 percent effective. Removal and containment efforts to respond to an ongoing spill offshore would likely require multiple technologies, including source containment, mechanical cleanup, in-situ burning of the slick, and chemical dispersants. Even with the deployment of all of these spill-response technologies, it is likely that, with the operating limitations of today's spill-response technology, not all of the oil could be contained and removed offshore.

B.2.2.7.1. Shallow Water

The following are estimates for the deployment of equipment and personnel during a shallow-water spill response. Within the first week of an oil spill originating in shallow water, 25 vessels are estimated to respond, which would steadily increase to over 3,000 by the end of the spill. This includes about 25 skimmers in the vicinity of the well at any given time. In addition, recovered oil may be barged to shore from recovery vessels. Within the first week, over 500 responders are estimated to be deployed to a spill originating in shallow water, which would steadily increase up to 25,000 before the well is capped or killed within 2-4 months. Up to 25 planes and 50 helicopters are estimated to respond per day by the end of a shallow-water spill. Response to an oil spill in shallow water is expected to involve over 10,000 ft (3,048 m) of boom within the first week and would steadily increase up to 5 million feet (~950 mi; ~1,520 km) for use offshore and nearshore; the amount is dependent upon the location of the potentially impacted shoreline, environmental considerations, and agreed upon protection strategies involving the local potentially impacted communities.

Dispersant use must be in accordance with the Regional Response Team's (RRT) Preapproved Dispersant Use Manual and with any conditions outlined within an RRT's site-specific, dispersant approval given after a spill event. Consequently, dispersant use would be in accordance with the restrictions for specific water depths, distances from shore, and monitoring requirements. At this time, this manual does not give preapproval for the application of dispersant use subsea. Aerial dispersants would likely be applied from airplanes as a mist, which settles on the oil on the water's surface. Along the Gulf Coast, surface dispersants are presently preapproved for use greater than 3 nautical miles (nmi) (3.5 mi; 5.6 km) from shore and in water depths greater than 33 ft (10 m), with the exception of Florida (U.S. Dept. of Homeland Security, CG, 2010). At this time, pursuant to a letter from the Florida Department of Environmental Protection dated May 5, 2011, sent to USCG, preapproval for dispersant use is not approved for any Florida State waters. However, the U.S. Environmental Protection Agency (USEPA) is presently revisiting these RRT preapprovals in light of the dispersant issues, such as subsea application that arose during the *Macondo* well blowout and spill response. In addition, revisions are presently being made to the RRT IV and VI's Preapproved Dispersant Use Manuals. The USEPA issued a letter dated December 2, 2010, that provided interim guidance on the use of dispersants for major spills that are continuous and uncontrollable for periods greater than 7 days and for expedited approval of subsurface applications. This letter outlined the following exceptions to the current preapprovals until they are updated:

- dispersants may not be applied to major spills that are continuous in nature and uncontrollable for a period greater than 7 days;
- additional dispersant monitoring protocols and sampling plans may be developed that meet the unique needs of the incident; and
- subsurface dispersants may be approved on an incident-specific basis as requested by the USCG On-Scene Commander.

More robust documentation of dispersant usage may be required. This documentation would include daily reports that contain the products used, the specific time and locations of application, equipment used for each application, spotter aircraft reports, photographs, vessel data, and analytical data. In addition to

dispersants, controlled burns may also occur. It is estimated that 5-10 controlled burns would be conducted per day in suitable weather. About 500 burns in all would remove 5-10 percent of the oil.

B.2.2.7.2. Deep Water

The following are estimates for the deployment of equipment and personnel during a deepwater spill response. Within the first week of an oil spill originating in deep water, 50 vessels are estimated to respond, which would steadily increase to over 7,000 by the end of the spill. This includes about 25 skimmers in the vicinity of the well at a time. In addition, recovered oil may be shuttle tankered to shore from recovery vessels. For an oil spill in deep water, over 1,000 responders are estimated to be deployed within the first week, which would steadily increase up to 50,000 before capping or killing the well within 4-5 months. Over 20,000 ft (6,096 m) of boom is estimated to be deployed within the first week of a deepwater spill, which would steadily increase up to 13.5 million feet (~2,257 mi; ~4,115 km) offshore and nearshore. The amount of boom would be dependent upon the location of the potentially impacted shoreline, environmental considerations, and agreed upon protection strategies involving the local potentially impacted communities. Up to 50 planes and 100 helicopters are estimated to respond per day by the end of a deepwater spill.

With the exception of special Federal management areas or designated exclusion areas, dispersants have been preapproved in the vicinity of a deepwater blowout (U.S. Dept. of Homeland Security, CG, 2010). However, USEPA is presently examining these preapprovals, and restrictions are anticipated regarding the future use of dispersants as a result. No preapproval presently exists for the use of subsea dispersants, and approval must be obtained before each use of this technology. The use of subsea dispersants depends on the location of the blowout, as discussed in **Table B-1**. Aerial dispersants are usually applied from airplanes as a mist, which settles on the oil on the water's surface. Major spills that are continuous and uncontrollable for periods greater than 7 days and the approval of subsurface dispersant application are presently subject to the guidance outlined in USEPA's letter dated December 2, 2010. This letter provides interim guidance on the use of dispersants for major spills and outlines exceptions to the current preapprovals until they are updated, as discussed more fully in **Chapter B.2.2.7.1**. For a deepwater spill, dispersant application may be a preferred response in the open-water environment to prevent oil from reaching a coastal area, in addition to mechanical response. However, the window of opportunity for successful dispersant application may be somewhat narrower for some deepwater locations depending on the physical and chemical properties of the oil, which tend to be somewhat heavier or more likely to emulsify than those found closer to shore. A significant reduction in the window of opportunity for dispersant application may render this response option ineffective.

In addition to dispersants, controlled burns may also occur. It is estimated that 5-10 controlled burns would be conducted per day in suitable weather. About 500 burns in all would remove 5-10 percent of the oil.

B.2.2.7.3. Vessel Decontamination Stations

To avoid contaminating inland waterways, multiple vessel decontamination stations may be established offshore in Federal and State waters. The selected locations to conduct decontamination of oiled vessels will, due to the unique aspects of each spill response, be decided by the Unified Command during the spill response effort. Since the Unified Command includes representatives of the affected state(s), the states will have a prominent voice regarding whether a location in State waters will be acceptable.

Vessels responding to the spill and commercial and recreational vessels passing through the spill would anchor, awaiting inspection. If decontamination is required, work boats would use fire hoses to clean oil from the sides of the vessels. This could result in some oiling of otherwise uncontaminated waters. While these anchorage areas would be surveyed for buried pipelines that could be ruptured by ship anchors, they may not be surveyed adequately for benthic communities or archaeological sites. Therefore, some damage to benthic communities or archaeological sites may occur because of vessel decontamination activities associated with an oil spill (Alabama State Port Authority, 2010; State of Florida, Office of the Governor, 2010; Nodar, 2010; Unified Incident Command, 2010a-c; USDOC, NOAA, 2010a; USEPA, 2012).

B.2.2.8. Severe Weather

A hurricane could accelerate biodegradation, increase the area affected by the spill, and slow or stop the response effort. The movement of oil would depend on the track, wind speed, and size of a hurricane. The official Atlantic hurricane season runs from June 1st through November 30th, with a peak of hurricane probability in September. In an average Atlantic season, there are 11 named storms, 6 hurricanes, and 2 Category 3 or higher storms (USDOC, NOAA, National Weather Service, 2010). As a result of a hurricane, high winds and seas would mix and weather the oil from an oil spill. This can help accelerate the biodegradation process (USDOC, NOAA, National Weather Service, 2012). The high winds may distribute oil over a wider area (USDOC, NOAA, National Weather Service, 2012).

Weather has been recognized as one of the most important factors in predicting oil-spill fate and behavior and in predicting the success of an oil-spill response. During an oil spill, booms, skimmers, oil burn, and the use of dispersants have been used to remove oil from the water surface. Adverse weather conditions will affect the use, performance, and effectiveness of booms and skimmers. Skimmers work best in calm wind; for wave heights greater than 1 m (3 ft), some skimmers will not work effectively. Conventional booms will not work at a current velocity of 0.5 meters per second (m/sec) (1.6 feet per second [ft/sec]) or greater. For oil burn, ignition cannot be carried out at wind speeds greater than 10 m/sec (33 ft/sec). The minimum wind speed for dispersant use is about 5 m/sec (16 ft/sec), and the maximum wind speed for the limit of dispersant applications is about 12-14 m/sec (39-46 ft/sec) (Fingas, 2004).

There are tradeoffs in deciding where and when to place boom because, once deployed, boom is time consuming to tend and to relocate. As previously noted, booming operations are sensitive to wind, wave, and currents, and those sections of boom need to be tethered and secured to keep them from moving. Furthermore, it was discovered during the *Deepwater Horizon* explosion, oil spill, and response that hard boom often did more damage than anticipated in the marsh it was intended to protect after weather conditions ended up stranding the boom back into the marsh. Due to time constraints prior to a hurricane event, it is therefore unlikely that much effort could be expended to move large amounts of deployed boom, particularly given the effort that would be required to move skimming equipment to safer locations inland and to move large numbers of response personnel to safer areas. However, since the conditions for each spill response are unique, these considerations would be examined and a site-specific hurricane response plan developed during the actual spill response effort by the Unified Command at the beginning of the official hurricane season.

In addition, adverse weather would reduce ability to respond to the spill and could result in delayed transport and placement of the capping stack. The action of wind on the water surface will generate waves. Typically, waves greater than 3 ft (1 m) will prevent smaller vessels from skimming in offshore waters; waves greater than 5 ft (1.5 m) will prevent even the larger vessels from getting offshore to skim. The new high-speed skimmers under development are very promising; some skimmers have recovered oil with wave heights of up to 10 ft (3 m) with corresponding winds of up to 15 m/sec (49 ft/sec).

In the event of a hurricane, vessels would evacuate the area, delaying response efforts, including the drilling of relief wells and any well capping or collection efforts. Severe weather, such as a hurricane, would delay the transport and placement of the capping stack. If a cap is applied and oil is flowed to a collection vessel, severe weather would cause the collection vessel to vacate its location and the oil would flow until the collection vessel could return and resume collection. Severe weather could also require that response assets be relocated inland. The response would be delayed because following the severe weather event the assets would need to be transported back to the staging areas. The speed with which the assets could be brought back to the locations would depend upon on the condition of the roads and bridges for traffic resumption and the amount of debris potentially blocking the roads.

B.2.3. Phase 3—Onshore Contact

B.2.3.1. Duration

The duration of shoreline oiling is measured from initial shoreline contact until the well is capped or killed and the remaining oil dissipates offshore. The time needed to cap or kill a well may vary depending on, among other things, the well's water depth, its location, the well and geologic formation characteristics, and the associated debris. Depending on the spill's location in relation to winds and currents and the well's distance to shore, oil could reach the coast within 1 week to 1 month, based on

evidence from previous spills in the Gulf of Mexico OCS (e.g., it was nearly 4 weeks after the *Macondo* well blowout and spill). While it is assumed that the majority of spilled oil would dissipate offshore within 30-60 days of stopping the flow, some oil may remain in coastal areas for some time after a spill, as was observed along the Gulf Coast following the *Macondo* well blowout and spill.

B.2.3.1.1. Shallow Water

Due to the distance from shore, oil spilled as a result of a blowout in shallow water could reach shore within 1-3 weeks and could continue until the well is killed or capped and the oil dissipates offshore. Therefore, it is estimated that initial shoreline oiling would likely occur for 2-5 months following a catastrophic blowout. Some shoreline areas could be re-oiled during this timeframe dependent upon the weather conditions at the time of the spill as well as the persistence of the spilled oil.

B.2.3.1.2. Deep Water

Intervention is more difficult and would take longer in deeper water, in part, because at these water depths these intervention efforts are conducted by remotely operated vehicles. In general, most of the deep water in the Gulf of Mexico is located farther from shore and, therefore, it is assumed that oil would reach shore within 2-4 weeks. However, for the few deepwater areas that are located closer to shore, such as in the Mississippi Canyon Area, the amount of estimated time until shoreline contact could be the same as the shallow-water scenario above (1-3 weeks). The length of shoreline oiled would continue to increase and previously oiled areas could be re-oiled until the well is killed or capped (3-4 months) and the oil dissipates offshore (1-2 months). Therefore, initial shoreline oiling could occur from 3 months up to 6 months following a catastrophic blowout. Persistent shoreline oiling is discussed in **Chapter B.2.4** (Phase 4) below.

B.2.3.2. Volume of Oil Contacting Shore

In the event of a catastrophic spill, not all of the oil spilled would contact shore. The amount of oil recovered and chemically or naturally dispersed would vary. For example, the following are recovery and cleanup rates from previous high-volume, extended spills:

- 10-40 percent of oil recovered or cleaned up (including burned, chemically dispersed, and skimmed);
- 25-40 percent of oil naturally dispersed, evaporated, or dissolved; and
- 20-65 percent of the oil remains available for offshore or inshore contact.

In the case of the *Macondo* well blowout and spill, the "expected" scenario, developed by the Oil Budget Calculator Science and Engineering Team of The Federal Interagency Solutions Group, suggests that more than one quarter (29%) was naturally or chemically dispersed into Gulf waters, while burning, skimming, and direct recovery from the wellhead removed one quarter (25%) of the oil released. Less than one quarter (23%) of the total oil naturally evaporated or dissolved. The residual amount, just under one quarter (23%), remained in the Gulf of Mexico as a light sheen or as tarballs that have washed ashore or are buried in sand and other sediments (The Federal Interagency Solutions Group, 2010).

For planning purposes, USCG estimates that 5-30 percent of oil will reach shore in the event of an offshore spill (33 CFR part 154, Appendix C, Table 2). Using the USCG assumptions, a catastrophic spill could result in a large amount of oil reaching shore.

B.2.3.3. Length of Shoreline Contacted

While larger spill volumes increase the chance of oil reaching the coast, other factors that influence the length and location of shoreline contacted include the duration of the spill and the well's location in relation to winds, currents, and the shoreline. Depending upon winds and currents throughout the spill event, already impacted areas could be re-oiled. As seen with the *Deepwater Horizon* oil spill, as the spill continued, the length of oiled shoreline at any one time increased by orders of magnitude as follows:

Duration of Spill	Length of Shoreline Oiled[1]
30 days	0-50 miles
60 days	50-100 miles
90 days	100-1,000 miles
120 days	>1,000 miles[2]

[1] Not cumulative.
[2] Length was extrapolated.

Source: USDOC, NOAA, 2011a.

B.2.3.3.1. Shallow Water

While a catastrophic spill from a shallow-water blowout is expected to be lower in volume than a deepwater blowout, as explained in **Chapter B.2.2.3**, the site would typically be closer to shore, allowing less time for oil to be weathered, dispersed, and recovered. This could result in a more concentrated and toxic oiling of the shoreline.

B.2.3.3.2. Deep Water

While a catastrophic spill from a deepwater blowout is expected to have a much greater volume than a shallow-water blowout (refer to **Chapter B.2.2.3**), the site would typically be farther from shore, allowing more time for oil to be weathered, dispersed, and recovered. This could result in broader, patchier oiling of the shoreline.

Translocation of the spilled oil via winds and currents is also a factor in the length of shoreline contacted. For example, oil could enter the Loop Current and then the Gulf Stream. However, the longer it takes oil to travel, the more it would degrade, disperse, lose toxicity, and break into streamers and tarballs (USDOC, NOAA, Office of Response and Restoration, 2010d).

B.2.3.4. Severe Weather

The official Atlantic hurricane season runs from June 1st through November 30th, with a peak in hurricane probability in September. In an average Atlantic season, there are 11 named storms, 6 hurricanes, and 2 Category 3 or higher storms (USDOC, NOAA, National Weather Service, 2010). In the event of a hurricane, vessels would evacuate the area, delaying response efforts, including the drilling of relief wells. The storm surge may push oil to the coastline and inland as far as the surge reaches, or the storm surge may remove the majority of oil from shore, as seen in some of the previous spills reviewed.

Movement of oil during a hurricane would depend greatly on the track of the hurricane in relation to the slick. A hurricane's winds rotate counter-clockwise. In general, a hurricane passing to the west of the slick could drive oil to the coast, while a hurricane passing to the east of the slick could drive the oil away from the coast.

Severe weather may distribute spilled oil over a wide area. Storm surge may carry oil into the coastal and inland waters and shore. Debris resulting from severe weather may be contaminated by oil. Thus, the responders need to take proper precautions if weathered oil is present. Weather that results in waves greater than 3 ft (1 m) prevents skimming in coastal waters so there is greater likelihood of contact with the shoreline. Severe weather would also displace or destroy shoreline boom so that oil could come into contact with the shoreline until responders put the boom back in place. Severe weather could require that assets be relocated inland. The response would be delayed because following the severe weather event the assets would need to be transported back to the staging areas. The speed with which the assets could be brought back to the locations would depend upon on the condition of the roads and bridges for traffic resumption and the amount of debris potentially blocking the roads.

The USEPA, USCG, other Federal response agencies, and applicable State agencies would work together to address oil spills reported to the National Response Center or reported by emergency responders before, during, or after a hurricane occurs. Response personnel will cleanup significant spills and take other actions appropriate to protect public health and the environment. This response would cover any OCS spills that may occur as a result of the hurricane or preexisting at the time of the

hurricane. Response activities may be interrupted or complicated during a hurricane event. Oil from an ongoing OCS spill event may be washed ashore during a hurricane event; could be weathered, diluted, or washed farther inland; and could be mixed with other contaminants from other sources released during a hurricane event (e.g., heating oil or industrial chemicals). For example, onshore sources account for most of the oil spilled during the past few hurricane seasons that has resulted in oiled property. After Hurricane Sandy, some oil heating tanks flooded and caused oiling of a property owner's own building(s). As such, depending on circumstances, a hurricane event during an OCS spill event could complicate and exacerbate spill impacts and response operations, but could also increase weathering and dilution.

B.2.3.5. Onshore Cleanup Activities

A large-scale response effort would be expected for a catastrophic blowout. The number of vessels and responders would increase steadily as the spill continued. In addition to the response described in **Chapter B.2.2.7**, the following response is also estimated to occur once the spill contacts the shore.

B.2.3.5.1. Shallow Water

- There would be 5-10 staging areas established.
- Weather permitting, about 200-300 skimmers could be deployed near shore to protect coastlines.

B.2.3.5.2. Deep Water

- There would be 10-20 staging areas established.
- Weather permitting, about 500-600 skimmers could be deployed near shore to protect coastlines. As seen in Louisiana following the *Macondo* well blowout and spill, a few hundred coastal skimmers could still be in operation a few months after the well is capped or killed (State of Louisiana, 2010).

B.2.3.5.3. Response Considerations for Sand Beaches for Both Shallow-Water and Deepwater Spills

- No mechanical techniques allowed in some areas.
- Surface residence balls (SRBs), also commonly known as tarballs, and surface residence patties (SRPs) are subject to smearing during the day; therefore, much of the beach cleanup can be expected to be conducted at night, if the weather is warm.
- There are marked differences in the sediments on the central Louisiana coast as compared with the Gulf beaches of Alabama, Florida, and Mississippi; therefore, no single technique will be universally applicable for cleaning sand beaches.
- Typically, sand sieving, shaking, and sifting beach cleaning machines will be utilized. The depth of cut below the sand surface can be expected to typically range from 0 to 12 inches (in) (0 to 30 centimeters [cm]) when using this equipment.
- It is anticipated that the responders will be instructed that no disturbance will be allowed below 18 in (46 cm). However, oil can be expected down to a depth of 24-26 in (61-66 cm) below the sand surface.
- Repetitive tilling and mixing may be used at beaches such as Grand Isle, using agriculture plows and discs in combination with beach cleaning machines. Sand washing treatment also may take place at beaches such as Grand Isle's beach. Sand washing includes a sand sieve/shaker to remove debris and large oil particles and a heated washing system. Average daily throughput for these systems would be

290 cubic yards per day. Sand treated in this manner is typically treated by sediment relocation, which is where the sand is moved to an active intertidal zone

B.2.3.5.4. Response Considerations for Marshes for Both Shallow-Water and Deepwater Spills

- Lightly oiled marsh may be allowed to recover naturally; the oil may be allowed to degrade in place or to be removed by tidal or wave action.
- Moderately or heavily oiled marsh could be cleaned by vacuuming or skimming from boats in conjunction with flushing to enhance oil recovery rates, low pressure flushing (with water comparable to marsh type), manual removal by hand or mechanized equipment, or vegetation cutting.
- In some heavily oiled areas, in-situ burning may be an option if water covers the sediment surface. This technique is only considered when the source is contained due to potential re-oiling of the area. Surface washing agents are also a technique that might be utilized.
- Bioremediation may be utilized but mostly as a secondary treatment after bulk removal.

B.2.3.5.5. Response Considerations for Nearshore Waters for Both Shallow-Water and Deepwater Spills

- Nearshore submerged oil is difficult to recover and hard to locate; vacuums and snares could be used.
- In the vicinity of marsh areas, skimming techniques with flushing could be utilized where warranted. In areas too shallow to use skimmers, oil removal could be accomplished using vacuum systems, in conjunction with flushing as needed. Booming could also be used to temporarily contain mobile slicks until they are recovered.

B.2.4. Phase 4—Post-Spill, Long-Term Recovery

During the final phase of a catastrophic blowout and spill, it is presumed that the well has been capped or killed and that cleanup activities are concluding. While it is assumed that the majority of spilled oil floating on surface waters would be dissipated within 30-60 days of stopping the flow, oil has the potential to persist in the environment long after a spill event and has been detected in sediment 30 years after a spill dependent upon the affected environment (USDOI, FWS, 2004). On sandy beaches, oil can sink deep into the sediments. In tidal flats and salt marshes, oil may seep into the muddy bottoms (USDOI, FWS, 2010a).

The multiple-year response required for the *Deepwater Horizon* explosion, oil spill, and response provided one example of a long-term recovery to a catastrophic spill in the Gulf of Mexico. After the *Deepwater Horizon* explosion, oil spill, and response, a multi-agency Operational Science Advisory Team (OSAT), under the direction of the USCG, was convened to provide information to help guide response activities and to provide a better understanding of the potential environmental and health risks after the *Deepwater Horizon* explosion, oil spill, and response. A summary of the OSAT findings include the following:

- OSAT, issued in December 2010, concluded that no recoverable *Macondo* oil remained in the water column. In addition, none of the roughly 17,000 water samples collected and analyzed exceeded the USEPA's benchmarks for protection of human health (OSAT, 2010).

- OSAT-2, issued in February 2011, found that residual oil in nearshore and sandy shoreline areas was highly weathered, and concentrations of constituents of concern were well below levels of concern for human health (OSAT, 2011a).
- The OSAT Ecotoxicity Addendum, issued in July 2011, found that, with respect to the indicators considered in the OSAT (2010) report, the results discussed in this addendum are consistent with the OSAT conclusions that "no exceedances of the USEPA's dispersant benchmarks were observed" and that "since 3 August 2010 (last day with potentially recoverable oil on the ocean surface), <1% of water samples and ~1% of sediment samples exceeded EPA's aquatic life benchmarks for polycyclic aromatic hydrocarbons (PAH's)." In addition, results of the toxicity tests support the conclusions of the OSAT report regarding the distribution of actionable (i.e., amenable to removal actions) oil and dispersant-related constituents (OSAT, 2011b).
- OSAT-3, finalized in early 2014, used a sophisticated scientific approach to identify potential discrete pockets of subsurface material. The OSAT-3 information was used to locate and recover potential subsurface material (British Petroleum, 2014). The OSAT-3 report also identified actions to be taken for reducing potential recurrence of oil along the northeastern shores of the Gulf of Mexico. In addition, the report evaluated the feasibility of each action taken to recover or remove *Macondo* oil and the net environmental benefit of employing each recovery technique recommended. This scientific support was provided to the Federal On-Scene Coordinator with shoreline segment-specific information to facilitate the operational decisionmaking process to recover residual *Macondo* oil (OSAT, 2013).

If a shoreline is oiled, the selection of the type of shoreline remediation to be used will depend on the following: (1) the type and amount of oil on the shore; (2) the nature of the affected coastline; (3) the depth of oil penetration into the sediments; (4) the accessibility and the ability of vehicles to travel along the shoreline; (5) the possible ecological damage of the treatment to the shoreline environment; (6) weather conditions; (7) the current state of the oil; and (8) jurisdictional considerations. To determine which cleanup method is most appropriate during a spill response, decisionmakers must assess the severity and nature of the injury using Shoreline Cleanup and Assessment Team survey observations. These onsite decisionmakers must also estimate the time it will take for an area to recover in the absence of cleanup (typically considering short term to be 1-3 years, medium term to be 3-5 years, and long term greater than 5 years) (National Response Team, 2010).

B.2.4.1. Response Considerations for Sand Beaches, Marshes, and Nearshore Waters for both Shallow-Water and Deepwater Spills

Once oiled, it can be expected that the shoreline response techniques employed in the initial phase of a response will become more extensive and continue for some time (**Chapters B.2.3.5.3, B.2.3.5.4, and B.2.3.5.5**). For example, spill response post-*Macondo* continued for years in some of the more heavily oiled areas in Louisiana and in other areas, such as Florida, Mississippi, and Alabama, which experienced periodic re-oiling from submerged oil mats that lie in the inshore surf zone in troughs between the sand bars or from buried oil onshore that resurfaces. The three types of oil residue that were identified as challenging or potentially damaging to the environment if removed includes the following: (1) supra-tidal buried oil (buried below the 6-in [15-cm] surface cleaning depth restriction near sensitive habitats); (2) small surface residual balls, which are oil residue left behind after beaches are cleaned; and (3) surf zone submerged oil mats. Active shoreline cleanup ended in June 2013 for the States of Florida, Mississippi, and Alabama. Active shoreline cleanup for Louisiana ended on April 15, 2014 (British Petroleum, 2014). However, efforts will continue to clean up any reported re-oiled shoreline in the GOM area as it is reported to the USCG. Although the re-oiling of some areas was anticipated to sporadically continue, it was determined that a better and more efficient long-term cleanup effort at this stage could be handled through the USCG. As of April 15, 2014, aerial reconnaissance flights were flown across approximately 14,000 mi (22,531 km) of shoreline during this spill response effort. Nearly 4,400 mi (7,081 km) were ground-surveyed, with teams identifying 1,104 mi (1,777 km) that experienced some level of oiling and 778 mi (1,252 km) that required some measure of cleaning (British Petroleum, 2014).

Amenity beaches were generally cleaned to depths of up to 5 ft (1.5 m), using mechanical equipment that sifts out residual oil and other debris from below the beach surface while returning clean sand to the beach. Nonrecreational beaches and environmentally sensitive areas were generally hand-cleaned to depths of up to 6 in (15 cm), but they were cleaned deeper if it was ecologically safe and approved by the USCG, stakeholders, and others. Multiple techniques were used to treat oiled marsh areas, with the goal of promoting natural attenuation without causing further damage. A scientific effort was launched in mid-2012 to locate and remove potential pockets of subsurface material in Louisiana. During this effort, more than 40,000 holes and pits were excavated across seven barrier islands. The vast majority either had no visible oil or levels so low that treatment was not appropriate or required. For example, just 3 percent of the more than 16,000 auger holes had oiling levels that required cleanup and less than 2 percent of the over 24,000 pits had heavy or moderate oiling. Assessment teams continuously surveyed the shoreline and recommended treatment options. More than 100,000 tons of material were collected from the cleanup efforts. The total consists of not only the mixed residual material, which was typically 10-15 percent residual oil and 85-90 percent sand, shells, and water but, during the first year of operations, it also included other solid material such as debris and protective clothing (British Petroleum, 2014a). Additional information regarding shoreline response considerations can be found in **Chapter 3.2.1.9**.

B.3. Description of the Environment and Impact Analysis

B.3.1. Long Duration—Large Volume Spill within the Gulf of Mexico

The following resource descriptions and impact analyses examined only the applicable portions of the scenario (described fully in **Chapter 3** and summarized in **Table B-4**).

B.3.1.1. Air Quality

Phase 1—Initial Event

A catastrophic blowout close to the water surface would initially emit large amounts of methane and other gases into the atmosphere. If high concentrations of sulfur are present in the produced gas, hydrogen sulfide (H_2S) could present a hazard to personnel. The natural gas H_2S concentrations in the Gulf of Mexico OCS are generally low; however, there are areas such as the Norphlet formation in the northeastern Gulf of Mexico, for example, that contain levels of H_2S up to 9 percent. Ignition of the blowout gas and subsequent fire would result in emissions of nitrogen oxides (NO_x), sulfur oxides (SO_x), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$). The fire could also produce PAHs, which are known to be hazardous to human health. The pollutant concentrations would decrease with downwind distance. A large plume of black smoke would be visible at the source and may extend a considerable distance downwind. However, with increasing distance from the fire, the gaseous pollutants would undergo chemical reactions, resulting in the formation of fine particulate matter ($PM_{2.5}$) that includes nitrates, sulfates, and organic matter. The $PM_{2.5}$ concentrations in the plume would have the potential to temporarily degrade visibility in any affected Prevention of Significant Deterioration (PSD) Class I areas (i.e., National Wilderness Areas and National Parks) and other areas where visibility is of significant value. Organic aerosols formed downwind from the *Macondo* well blowout and spill (de Gouw et al., 2011), during which the lightest compounds, the VOCs, in the oil from the *Macondo* well blowout and spill evaporated within hours and during which the heavier compounds took longer to evaporate, contributing to the formation of air pollution particles downwind.

Phase 2—Offshore Spill

In the Gulf of Mexico, evaporation from the oil spill would result in concentrations of VOCs in the atmosphere, including chemicals that are classified as being hazardous. The VOC concentrations would occur anywhere where there is an oil slick, but they would be highest at the source of the spill because the rate of evaporation depends on the volume of oil present at the surface. The VOC concentrations would decrease with distance as the layer of oil gets thinner. The lighter compounds of VOCs would be most abundant in the immediate vicinity of the spill site. The heavier compounds would be emitted over a

longer period of time and over a larger area. Some of the compounds emitted could be hazardous to workers in close vicinity of the spill site. The hazard to workers can be reduced by monitoring and using protective gear, including respirators, as well as limiting exposure through limited work shifts, rotating workers out of high exposure areas, and pointing vessels into the wind. During the *Macondo* well blowout and spill, air samples collected by individual offshore workers of British Petroleum (BP), the Occupational Safety and Health Administration (OSHA), and USCG showed levels of benzene, toluene, ethylbenzene, and xylene that were mostly under detection levels. All samples had concentrations below the OSHA permissible exposure limits and the more stringent ACGIH (American Conference of Governmental Industrial Hygienists) threshold limit values (U.S. Dept. of Labor, OSHA, 2010a).

The VOC emissions that result from the evaporation of oil contribute to the formation of particulate matter ($PM_{2.5}$) in the atmosphere. In addition, VOCs could cause an increase in ozone levels, especially if the release were to occur on a hot, sunny day with sufficient concentrations of NO_x present in the lower atmosphere. However, because of the distance of the proposed CPA lease sale area from shore, the oil slick would not likely have any effects on onshore ozone concentrations; however, if there were any effects to onshore ozone concentrations, they would likely only be temporary in nature and last at most the length of time of the spill duration.

It is assumed that response efforts would include hundreds of in-situ or controlled burns, which would remove an estimated 5-10 percent of the volume of oil spilled. This could be as much as 720,000 bbl of oil for a spill of 60,000 bbl per day for 90 days. In-situ burning would result in ambient concentrations of CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$ very near the site of the burn and would generate a plume of black smoke. The levels of $PM_{2.5}$ could be a hazard to personnel working in the area, but this could be effectively mitigated through monitoring and relocating vessels to avoid areas of highest concentrations. In an experiment of an in-situ burn off Newfoundland, it was found that CO, SO_2, and NO_2 were measured only at background levels and were frequently below detection levels (Fingas et al., 1995). Limited amounts of formaldehyde and acetaldehyde were measured, but concentrations were close to background levels. Measured values of dioxins and dibenzofurans were at background levels. Measurements of PAH in the crude oil, the residues, and the air indicated that the PAH in the crude oil are largely destroyed during combustion (Fingas et al., 1995).

While containment operations may be successful in capturing some of the escaping oil and gas, recovery vessels may not be capable of storing the crude oil or may not have sufficient storage capacity. In this case, excess oil would be burned; captured gas cannot be stored or piped to shore so it would be flared. For example, in the *Macondo* well blowout and spill, gas was flared at the rate of 100-200 million cubic feet per day and oil burned at the rate of 10,000-15,000 bbl per day. The estimated NO_x emissions are about 13 tons per day. The SO_2 emissions would be dependent on the sulfur content of the crude oil. For crude oil with a sulfur content of 0.5 percent, the estimated SO_2 emissions are about 16 tons per day. Particulate matter in the plume would also affect visibility. Flaring or burning activities upwind of a PSD Class I area, e.g., the Breton National Wilderness Area, could adversely affect air quality there because of increased levels of SO_2, PM_{10}, and $PM_{2.5}$, and because of reduced visibility.

Phase 3—Onshore Contact

As the spill nears shore, there would be low-level concentrations of odor-causing pollutants associated with evaporative emissions from the oil spill. These may cause temporary eye, nose, or throat irritation, nausea, or headaches, but the doses are not thought to be high enough to cause long-term harm (USEPA, 2010a). However, responders could be exposed to levels higher than OSHA occupational permissible exposure levels (U.S. Department of Labor, OSHA, 2010b). During the *Deepwater Horizon* explosion, oil spill, and response, USEPA took air samples at various onshore locations along the length of the Gulf coastline. All except three measurements of benzene were below 3 parts per billion (ppb). The highest level was 91 ppb. Emissions of benzene to the atmosphere result from gasoline vapors, auto exhaust, and chemical production and user facilities. Ambient concentrations of benzene up to and greater than 5 ppb have been measured in industrial areas such as Houston, Texas; in various urban areas during rush hour; and inside the homes of smokers (U.S. Dept. of Health and Human Services, 2007). The following daily median benzene air concentrations were reported in the Volatile Organic Compound National Ambient Database (1975-1985): remote (0.16 ppb); rural (0.47 ppb); suburban (1.8 ppb); urban (1.8 ppb); indoor air (1.8 ppb); and workplace air (2.1 ppb). The outdoor air data represent 300 cities in 42 states, while the indoor air data represent 30 cities in 16 states (Shah and Singh, 1988).

During the *Deepwater Horizon* explosion, oil spill, and response, air samples collected by BP, OSHA, and USCG near shore showed levels of benzene, toluene, ethylbenzene, and xylene that were mostly under detection levels. Among the 28,000 personal benzene samples taken by BP, there was only 1 sample where benzene exceeded the OSHA occupational permissible exposure limits, and 6 additional validated constituents were in excess of the ACGIH threshold limit value. All other sample concentrations were below the more stringent ACGIH threshold limit values (U.S. Department of Labor, OSHA, 2010a). All measured concentrations of toluene, ethylbenzene, and xylene were well within the OSHA occupational permissible exposure levels and ACGIH threshold limit values.

Phase 4—Post-Spill, Long-Term Recovery and Response

There would be some residual air quality impacts after the well is capped or killed. As most of the oil would have been burned, evaporated, or weathered over time, air quality would return to pre-oil spill conditions. While impacts to air quality are expected to be localized and temporary, adverse effects that may occur from the exposure of humans and wildlife to air pollutants could have long-term consequences.

Overall Summary and Conclusion (Phases 1-4)

The OCS oil- and gas-related catastrophic event could include the release of oil, condensate, or natural gas or chemicals used offshore or pollutants from the burning of these products. The air pollutants include criteria National Ambient Air Quality Standards (NAAQS) pollutants, volatile and semi-volatile organic compounds, H_2S, and methane. If a fire was associated with the event, it would produce a broad array of pollutants, including all NAAQS-regulated primary pollutants, including NO_2, CO, SO_x, VOC, PM_{10}, and $PM_{2.5}$. Response activities that could impact air quality include in-situ burning, the use of flares to burn gas and oil, and the use of dispersants applied from aircraft. Measurements taken during an in-situ burning show that a major portion of compounds was consumed in the burn; therefore, pollutant concentrations would be expected to be within the NAAQS. In a recent analysis of air in coastal communities, low levels of dispersant components, which are also used in everyday household products, were identified. These response activities are temporary in nature and occur offshore; therefore, there are little expected impacts from these actions to onshore air quality. Catastrophic events involving high concentrations of H_2S could result in deaths as well as environmental damage. Regulations and NTLs mandate safeguards and protective measures, which are in place, to protect workers from H_2S releases. Other emissions of pollutants into the atmosphere from catastrophic events are not projected to have significant impacts on onshore air quality because of the prevailing atmospheric conditions, emissions height, emission rates, and the distance of these emissions from the coastline.

Overall, since loss of well-control events, blowouts, and fires are rare events and of short duration, potential impacts to air quality are not expected to be significant except in the rare case of a catastrophic event. To date, air monitoring conducted following the *Macondo* well blowout and spill, has not found any pollutants at levels expected to cause long-term harm (USEPA, 2010b).

B.3.1.2. Water Quality

Phase 1—Initial Event

Offshore Water Quality

During the initial phase of a catastrophic blowout, water quality impacts include the disturbance of sediments and the release and suspension of oil and natural gas (primarily methane) into the water column. These potential impacts are discussed below. As this chapter deals with the immediate effects of a blowout that would be located at least 3 nmi (3.5 mi; 5.6 km) from shore, it is assumed that there would be no impacts on coastal water quality during this initial stage.

Disturbance of Sediments

A catastrophic blowout below the seafloor, outside the wellbore (**Table B-1**) has the potential to resuspend sediments and disperse potentially large quantities of bottom sediments. Some sediment could travel several kilometers, depending on particle size and subsea current patterns. In the deep Gulf of

Mexico, surficial sediments are mostly composed of silt and clay, and, if resuspended, could stay in the water column for several hours to days. Bottom current measurements in the deep Gulf of Mexico were synthesized as part of the MMS Deepwater Reanalysis study and have been measured to reach 90 centimeters/second (cm/sec) (35.4 inches/second [in/sec]) with mean flows of 0.4-21 cm/sec (0.2-8.3 in/sec) (Nowlin et al., 2001). At these mean flow rates, resuspended sediment could be transported 0.3-18 km per day (0.2-11 mi per day).

Sediment resuspension can lead to a temporary change in the oxidation-reduction chemistry in the water column, including a localized and temporal release of any formally sorbed metals, as well as nutrient recycling (Caetano et al., 2003; Fanning et al., 1982). Sediments also have the potential to become contaminated with oil components.

A subsea release also has the potential to destabilize the sediments and create slumping or larger scale sediment movements along depth gradients. These types of events would have the potential to move and/or damage any infrastructure in the affected area.

Release and Suspension of Oil into the Water Column

A subsea release of hydrocarbons at a high flow rate has the potential to disperse and suspend plumes of oil droplets (chemically dispersed or otherwise) within the water column and to induce large patches of sheen and oil on the surface. These dispersed hydrocarbons may adsorb onto marine detritus (marine snow), suspended sediments, or may be mixed with drilling mud and deposited near the source. Mitigation efforts such as burning may introduce hydrocarbon byproducts into the marine environment, which would be distributed by surface currents. The acute and chronic sublethal effects of these dilute suspended "plumes" are not well understood and require future research efforts.

As a result of the *Macondo* well blowout and spill, a subsurface oil and gas plume was discovered in deep waters between ~1,100 and 1,300 m (3,609 and 4,265 ft) (e.g., Diercks et al., 2010) in addition to the surface slick. Measurable amounts of hydrocarbons (dispersed or otherwise) were detected in the subsurface plumes and on the seafloor in the vicinity of the release (e.g., Diercks et al., 2010; OSAT, 2010). In the *Macondo* well blowout and spill subsurface plume, half-lives were estimated for petroleum hydrocarbons and n-alkanes on the order of 1 month and several days, respectively, indicating the impacts of various weathering processes (Reddy et al., 2011 and references therein). After the *Ixtoc I* well blowout and spill in 1979, which was located 50 mi (80 km) offshore in the Bay of Campeche, Mexico, some subsurface oil was also observed dispersed within the water column (Boehm and Fiest, 1982); however, the scientific investigations were limited (Reible, 2010). The water quality of offshore waters would be affected by the dissolved components and oil droplets that are small enough that they do not rise to the surface or are mixed down by surface turbulence. In the case of subsurface oil plumes, it is important to remember that these plumes would be affected by subsurface currents, dilution, and natural physical, chemical, and biological degradation processes including weathering.

Large quantities of oil put into offshore water may alter the chemistry of the sea with unforeseeable results. The properties and persistence of oil, including oil in the Gulf of Mexico, is further discussed in **Chapter B.2.2.4**. The VOCs, including benzene, toluene, ethylbenzene, and xylenes (also referred to as BTEX), are highly soluble and can have acutely toxic effects; however, VOCs are light-weight oil components and tend to evaporate rather than persist in the environment (Michel, 1992). Middle-weight organic components tend to pose the greatest risk in the environment because they are more persistent in the environment, are more bioavailable, and include PAHs, which have high toxicities (Michel, 1992). To determine the overall toxicity of PAHs in water or sediment, the contributions of every individual PAH compound in the petroleum mixture must be included (USEPA, 2011). This approach was used during the *Macondo* well blowout, spill and response in determining the potential risk of PAHs in both water and sediment to humans or animals in the environment (OSAT, 2010). Heavier components of crude oil tend to pose less risk of toxicity because they are not very soluble in water and therefore are less bioavailable.

The oil that entered the Gulf of Mexico from the *Macondo* well blowout and spill was a South Louisiana sweet crude oil (i.e., low in sulfur) (USDOC, NOAA, 2010b). This oil is less toxic than other crude oils in general because this oil is lower in PAHs than many other crude oils. Studies indicate that the oil contained approximately 3.9 percent PAHs by weight, which results in an estimated release of 2.1×10^{10} grams of PAHs (Reddy et al., 2011; Reddy, official communication, 2012). The oil was also fairly high in alkanes (organic compounds containing only carbon and hydrogen and single bonds,

sometimes called paraffin or aliphatic compounds) (USDOC, NOAA, 2010b). Because alkanes are simple hydrocarbons, these oils are likely to undergo biodegradation more easily (USDOC, NOAA, 2010b).

Release of Natural Gas (Methane) into the Water Column

A catastrophic blowout could release natural gas into the water column; the amount of gas released is dependent upon the water depth, the natural gas content of the formation being drilled, and its pressure. Methane is the primary component of natural gas. Methane may stay in the marine environment for long periods of time (Patin, 1999; page 237), as methane is highly soluble in seawater at the high pressures and cold temperatures found in deepwater environments (NRC, 2003; page 108). However, methane diffusing through the water column would likely be oxidized in the aerobic zone and would rarely reach the air-water interface (Mechalas, 1974; page 23). In addition to methane, natural gas contains smaller percentages of other gases such as ethane, propane, and to a much lesser degree H_2S (NaturalGas.org, 2012), which can be toxic in the environment. The majority of natural gas components including methane are carbon sources, and their introduction into the marine environment could result in reducing the dissolved oxygen levels because of microbial degradation potentially creating hypoxic or "dead" zones. Unfortunately, little is known about methane toxicity in the marine environment, but there is concern as to how methane in the water column might affect fish. Further discussion of natural gas released during the *Macondo* well blowout and spill is given in **Chapter B.2.2.5**.

Phase 2—Offshore Spill

Offshore Water Quality

The water offshore of the Gulf's coasts can be divided into two regions: the continental shelf and slope (<1,000 ft; 305 m) and deep water (>1,000 ft; 305 m). Waters on the continental shelf and slope are heavily influenced by the Mississippi and Atchafalaya Rivers, the primary sources of freshwater, sediment, nutrients, and pollutants from a huge drainage basin encompassing 55 percent of the continental U.S. (Murray, 1998). Lower salinities are characteristic nearshore where freshwater from the rivers mix with Gulf waters. The presence or extent of a nepheloid layer, a body of suspended sediment at the sea bottom (Kennett, 1982, page 524), affects water quality on the shelf and slope. Deep waters east of the Mississippi River are affected by the Loop Current and associated warm-core (anti-cyclonic) eddies, which flush the area with clear, low-nutrient water (Muller-Karger et al., 2001) (**Figure B-2**). However, cold-core cyclonic eddies (counter-clockwise rotating) also form at the edge of the Loop Current and are associated with upwelling and nutrient-rich, high-productivity waters, although the extent of this flushing can vary seasonally.

While response efforts would decrease the fraction of oil remaining in Gulf waters, significant amounts of oil would remain. Natural processes will physically, chemically, and biologically aid the degradation of oil (NRC, 2003). The physical processes involved include evaporation, emulsification, and dissolution, while the primary chemical and biological degradation processes include photo-oxidation and biodegradation (i.e., microbial oxidation). Water quality would not only be impacted by the oil, gas, and their respective components, but also to some degree, from cleanup and mitigation efforts, such as from increased vessel traffic and the addition of dispersants and methanol to the marine environment.

In the case of a catastrophic subsea blowout in deep water, it is assumed that large quantities of subsea dispersants would be used. The positive effect of using dispersants is that the oil, once dispersed, may be more available to be degraded (however, we note that contrary findings for beached oil were presented by Hamdan and Fulmer, 2011). The negative effect is that the oil, once dispersed, is also more bioavailable to have toxic effects to microorganisms as well. The toxicity of dispersed oil in the environment would depend on many factors, including the effectiveness of the dispersion, temperature, salinity, degree of weathering, type of dispersant, and degree of light penetration in the water column (NRC, 2005). The toxicity of dispersed oil is primarily because of the toxic components of the oil itself (Australian Maritime Safety Authority, 2010).

As a result of the use of dispersants, it would be more likely for clouds or plumes of dispersed oil to occur near the blowout site as was seen during the *Macondo* well blowout and spill. Dissolved oxygen levels are a concern with any release of a carbon source, such as oil and natural gas, and became a particular concern during the *Macondo* well blowout and spill since dispersants were used in deep waters

for the first time. In areas where plumes of dispersed oil were previously found, dissolved oxygen levels decreased by about 20 percent from long-term average values in the GOM of ~6.9 milligrams/liter (spring climatological mean at 1,500-m [4,921 -ft] depth); however, scientists reported that these levels stabilized and were not low enough to be considered hypoxic (Joint Analysis Group, 2010; USDOC, NOAA, 2010c). The drop in oxygen, which did not continue over time, has been attributed to microbial degradation of the oil.

Phase 3—Onshore Contact

Coastal Water Quality

Water quality governs the suitability of waters for plant, animal, and human use. Water quality is important in the bays, estuaries, and nearshore coastal waters of the Gulf because these waters provide feeding, breeding, and/or nursery habitat for many invertebrates and fishes, as well as sea turtles, birds, and marine mammals. A catastrophic spill would significantly impact coastal water quality in the Gulf of Mexico. Water quality prior to the *Macondo* well blowout and spill was rated as fair while sediment quality was rated as poor (USEPA, 2008). In addition, the coastal habitat index, a rating of wetlands habitat loss, was also rated as poor. Both the sediment quality and the coastal habitat index affect water quality.

Though response efforts would decrease the amount of oil remaining in Gulf waters and reduce the amount of oil contacting the coastline, significant amounts of oil would remain. Coastal water quality would be impacted not only by the oil, gas, and their respective components but also to some degree from cleanup and mitigation efforts. Increased vessel traffic, hydromodification, and the addition of dispersants and methanol in an effort to contain, mitigate, or clean up the oil may also tax the environment.

The use of dispersants as a response tool involves a tradeoff. The purpose of chemical dispersants is to facilitate the movement of oil into the water column in order to encourage weathering and biological breakdown of the oil (i.e., biodegradation) (NRC, 2005; Australian Maritime Safety Authority, 2010). Thus, the tradeoff is generally considered to be oiling of the shoreline and surface of the water versus the water column and benthic resources (NRC, 2005). If the oil moves into the water column and is not on the surface of the water, it is less likely to reach sensitive shore areas (USEPA, 2010a). Since sea birds are often on the surface of the water or in shore areas, dispersants are also considered to be very effective in reducing the exposure of sea birds to oil (Australian Maritime Safety Authority, 2010). In addition to dispersion being enhanced by artificial processes, oil may also be dispersed from natural processes including both (bio)chemical and physical processes. For instance, microbial metabolism of crude oil results in the dispersion of oil (Bartha and Atlas, 1983), and conditions at the source of the oil/gas leak (e.g., orifice size and shape) may cause physical dispersion of the oil. Dispersion has both positive and negative effects. The positive effect is that the oil, once dispersed, is more available to be degraded. The negative effect is that the oil, once dispersed, is also more bioavailable to have toxic effects to microorganisms as well. For example, a recent study using mesocosm experiments suggested that dispersed oil could disrupt coastal microbial foodwebs in the northern Gulf of Mexico, reducing the flow of carbon to higher trophic levels (Ortmann et al., 2012). The toxicity of dispersed oil in the environment will depend on many factors, including the effectiveness of the dispersion, temperature, salinity, the degree of weathering, type of dispersant, and the degree of light penetration in the water column (NRC, 2005). The toxicity of dispersed oil is primarily because of the toxic components of the oil itself (Australian Maritime Safety Authority, 2010).

Oxygen and nutrient concentrations in coastal waters vary seasonally. The zone of hypoxia (depleted oxygen) on the Louisiana-Texas shelf occurs seasonally and is affected by the timing of freshwater discharges from the Mississippi and Atchafalaya Rivers. The hypoxic conditions continue until local wind-driven circulation mixes the water again. The 2010 hypoxic zone could not be linked to the *Macondo* well blowout and spill in either a positive or a negative manner (Louisiana Universities Marine Consortium, 2010). Nutrients from the Mississippi River nourished phytoplankton and contributed to the formation of the hypoxic zone.

Phase 4—Post-Spill, Long-Term Recovery and Response

The leading source of contaminants that impairs coastal water quality in the Gulf of Mexico is urban runoff. It can include suspended solids, heavy metals, pesticides, oil, grease, and nutrients (such as from lawn fertilizer). Urban runoff increases with population growth, and the Gulf Coast region has experienced a 109 percent population growth since 1970, with an additional expected 15 percent increase expected by 2020 (USDOC, NOAA, 2011b). Other pollutant source categories include (1) agricultural runoff, (2) municipal point sources, (3) industrial sources, (4) hydromodification (e.g., dredging), and (5) vessel sources (e.g., shipping, fishing, and recreational boating). The NRC (2003, Table I-4, page 237) estimated that, on average, approximately 26,324 bbl of oil per year entered Gulf waters from petrochemical and oil refinery industries in Louisiana and Texas. The Mississippi River introduced approximately 3,680,938 bbl per year (NRC, 2003, Table I-9, page 242) into the waters of the Gulf. Hydrocarbons also enter the Gulf of Mexico through natural seeps in the Gulf at a rate of approximately 980,392 bbl per year (a range of approximately 560,224-1,400,560 bbl per year) (NRC, 2003, page 191). Produced water (formation water) is, by volume, the largest waste stream from the oil and gas industry that enters Gulf waters (e.g., **Table B-3**). The NRC has estimated the quantity of oil in produced water entering the Gulf per year to be 473,000 bbl (NRC, 2003, page 200, Table D-8).[1] These sources total about 5.5 MMbbl of oil per year that routinely enters Gulf of Mexico waters. In comparison, a catastrophic spill of 30,000-60,000 bbl per day for 90-120 days would spill a total of 2.7-7.2 MMbbl of oil. When added to the other sources of oil listed above, this would result in a 48- to 129-percent increase in the volume of oil entering the water during the year of the spill. In addition, the oil from a catastrophic spill will be much more concentrated in some locations than the large number of other activities that release oil into the Gulf of Mexico. **Chapter B.2.2.4** discusses the properties and persistence of oil in the environment.

Overall Summary and Conclusion (Phases 1-4)

During Phase 1 of the catastrophic blowout scenario, impacts are not expected to coastal water quality. Instead, the initial impacts will include degradation of offshore water quality, disturbance and degradation of sediments, and the release and suspension of oil and natural gas into the water column, including the possible formation of plumes. Fine sediments could be transported away from the spill site.

As the spill continues during Phase 2, response efforts and natural degradation processes would decrease the amount of oil in the Gulf, but significant amounts of oil would remain to impact water and sediment quality. Water and sediment quality would not only be impacted by the oil, gas, and their respective components but also to some degree from cleanup and mitigation efforts. The use of dispersants as a response tool may make the oil more available to degradation, but it can also make the oil more bioavailable to have toxic effects on microorganisms as well. Furthermore, dispersed oil is more likely to form a plume.

Onshore contact is made during Phase 3, so coastal sediment and water quality will be significantly impacted during this phase despite response efforts. Response efforts may even tax the coast to some degree. Natural and chemical dispersion may reduce the contact of oil with the shoreline but result in more oil in the water column and greater bioavailability of the dispersed oil.

The long-term recovery (Phase 4) of the water and sediment quality of the Gulf will depend on the properties and persistence of the oil as noted in **Chapter B.2.2.4**. Though the spill will increase the amount of oil entering the Gulf of Mexico, oil regularly enters the Gulf through sources such as oil refineries, the Mississippi River, produced water, and natural seeps. However, oil from a spill will be more concentrated than the oil input from these other sources.

1 These numbers were generated from converting the units reported in the noted reference and do not imply any level of significance.

B.3.1.3. Coastal Barrier Beaches and Associated Dunes

Phase 1—Initial Event

There would likely be no adverse impacts to coastal barrier beaches and associated dunes as a result of the events and the potential impact-producing factors that could occur throughout Phase 1 of a catastrophic spill event because these resources would not be contacted until the oil reached the shoreline.

Phase 2—Offshore Spill

There would likely be no adverse impacts to coastal barrier beaches and associated dunes as a result of the events and the potential impact-producing factors that could occur throughout Phase 2 of a catastrophic spill event because these resources would not be contacted until the oil reached the shoreline.

Phase 3—Onshore Contact

Barrier islands make up more than two-thirds of the northern Gulf of Mexico shore. Each of the barrier islands is either high profile or low profile, depending on the elevations and morphology of the island (Morton et al., 2004). The distinguishing characteristics of the high- and low-profile barriers relate to the width of the islands along with the continuity of the frontal dunes. Low-profile barriers are narrow with discontinuous frontal dunes easily overtopped by storm surge, which makes the island susceptible to over wash and erosion. This over wash can create channels to bring sand onto the island or into lagoons formed on these islands. High-profile barrier islands are generally wider than the low-profile islands and have continuous, vegetated, frontal dunes with elevations high enough to prevent over wash from major storm surge and, therefore, are less susceptible to erosion. The sand stored in these high-profile dunes allows the island to withstand prolonged erosion and therefore prevents breaching, which could result in damaging the island core.

The effects from oil spills depend on the geographic location, volume, and rate of the spill; type of oil; oil-slick characteristics; oceanic conditions and season at the time of the spill; and response and cleanup efforts. The effects could include changes in plant species diversity that could result in changes in forage areas for species using microfauna as a food base (Teal and Howarth, 1984). Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

As a result of a catastrophic spill, many of the barrier islands and beaches would receive varying degrees of oiling. The depth of oiling would be variable, based on the wave environment and sediment source at a particular beach head. Layering of oil and sand could occur if it was not cleaned before another tidal cycle. However, most areas of oiling are expected to be light, and sand removal during cleanup activities should be minimized. The severity of oiling dictates the appropriate cleanup method to be utilized (refer to **Table B-4**).

In areas designated as natural wilderness areas (e.g., Breton National Wildlife Refuge and Gulf Islands National Seashore), land managers may require little to no disruption of the natural system. In these environments, it is preferred to let the oil degrade naturally without aggressive and intrusive cleanup procedures. Manual rather than mechanized removal techniques would be used in these areas and only if heavy oiling has occurred. Thus, these areas may not be treated as thoroughly as other shorelines. Oil would remain in place longer, weathering gradually while continuing to contaminate habitat, though mechanical disturbance would be minimized.

Once oil has reached the beaches and barrier islands and becomes buried or sequestered, it becomes difficult to treat. The oil is generally toxic to barrier beach vegetation (Ko and Day, 2004). During wave events when the islands and beaches erode, the oil can become remobilized and transported (Daylander et al., 2014). Thus, the fate of oil is not as simple as either reaching land, becoming sequestered, or being treated; but, it must be considered in terms of a continuing process of sequestration, remobilization, and transport.

For spilled oil to move onto beaches or across dunes, strong southerly winds must persist for an extended time prior to or immediately after the spill to elevate water levels. Strong winds, however, could reduce the impact severity at a landfall site by accelerating the processes of oil-slick dispersal, spill spreading, and oil weathering.

The oil from the *Deepwater Horizon* explosion was documented by shoreline assessment teams to have oiled 901 km (560 mi) of beach shoreline (Michel et al., 2013). Bik et al. (2012) found that, despite

the disappearance of visible surface oil on heavily oiled Gulf beaches impacted by the oil spill, microbial communities showed significant changes in community structure, with a decrease in diversity and a shift toward dominance by fungal taxa, particularly known hydrocarbon-degrading genera. Numerous studies have shown that bacterial communities present in beaches gradually degrade the oil (Urbano et al., 2013; Newton et al., 2013; Kostka et al., 2011). Due to the distance of beaches from deepwater blowouts and the combination of weathering and dispersant treatment of the oil offshore, the toxicity and quantity of the oil reaching shore should be greatly reduced, thereby minimizing the chances of irreversible damage to the impacted areas. A blowout in shallower waters near shore may have equal or greater impacts because of a shorter period of weathering and dispersion prior to shoreline contact, even though a smaller volume of spilled oil would be expected.

Phase 4—Post-Spill, Long-Term Recovery and Response

Oil or its components that remain in the sand after cleanup may be (1) released periodically when storms and high tides resuspend or flush beach sediments, (2) decomposed by biological activity, or (3) volatilized and dispersed. While it is assumed that the majority of spilled oil would be dissipated offshore within 1-2 months (depending on season and temperature) of stopping the flow, oil has the potential to persist in the environment long after a spill event. For example on sandy beaches, oil can sink deep into the sediments. As stranded oil weathers, some oil may become buried through natural beach processes and appear as surface residual balls (SRBs; <10 cm [4 in]) or as surface residual patties (SRPs; 10 cm to 1 m [4 in to 3 ft]) **(Table B-4)**. Such balls continue to provide a source of contamination with accompanying toxic effects. For at least 4 years after the *Deepwater Horizon* explosion, oil spill, and response, tarballs were observed washing up on Alabama beaches, and submerged oil mats were observed between the shoreline and the longshore sandbar (Hayworth et al., 2015).

The cleanup impacts of a catastrophic spill could result in short-term (up to 2 years) adjustments in beach profiles and configurations as a result of sand removal and disturbance during cleanup operations. Mechanical sifting of sand to remove oil also removes wrack and organisms that are present, impacting community ecology of the beach. Some oil contact to lower areas of sand dunes is expected. This contact would not result in significant destabilization of the dunes. The long-term stressors to barrier beach communities caused by the physical effects and chemical toxicity of an oil spill may lead to decreased primary production, plant dieback, and hence, further erosion (Ko and Day, 2004).

The protection once afforded to inland marshes by coastal barrier beaches has been greatly reduced because of decreased elevations and the continued effect of subsidence, sea-level rise, and saltwater intrusion. A catastrophic spill has the potential to contribute to this reduction through increased erosion as a result of plant dieback and cleanup efforts.

Overall Summary and Conclusion (Phases 1-4)

As a result of a catastrophic spill, many of the barrier islands and beaches would receive varying degrees of oiling. However, most areas of oiling are expected to be lightly oiled, and sand removal during cleanup activities should be minimal. The long-term stressors to barrier beach communities caused by the physical effects and chemical toxicity of an oil spill may lead to decreased primary production, plant dieback, and hence, further erosion.

B.3.1.4. Wetlands

Phase 1—Initial Event

There would likely be no adverse impacts to wetlands as a result of the events and the potential impact-producing factors that could occur throughout Phase 1 of a catastrophic spill event because these resources would not be contacted until the oil reached the shoreline.

Phase 2—Offshore Spill

There would likely be no adverse impacts to wetlands as a result of the events and the potential impact-producing factors that could occur throughout Phase 2 of a catastrophic spill event because these resources would not be contacted until the oil reached the shoreline.

Phase 3—Onshore Contact

Coastal wetland habitats in the Gulf of Mexico occur as bands around waterways; broad expanses of saline, brackish, and freshwater marshes; mud and sand flats; and forested wetlands of cypress-tupelo swamps and bottomland hardwoods. Offshore oil spills would have a low probability of contacting and damaging any wetlands along the Gulf Coast, except in the case of a catastrophic event. This is because of the distance of the spill to the coast, the likely weathered condition of oil (through evaporation, dilution, and biodegradation) should it reach the coast, and because wetlands are generally protected by barrier islands, peninsulas, sand spits, and offshore currents.

While a catastrophic spill from a shallow-water blowout is expected to be lower in volume than a deepwater blowout, a potential shallow-water site could be closer to shore, allowing less time for oil to be weathered, dispersed, and recovered before it impacted coastal resources.

The oil from the *Deepwater Horizon* explosion was documented by shoreline assessment teams to have oiled 776 km (482 mi) of marsh shoreline (Michel et al., 2013). One study of the impacts of the *Deepwater Horizon* explosion, oil spill, and response to salt marshes in Louisiana estimated the area affected to be between 350 and 400 km^2 (135 and 154 mi^2), based on decreased primary production (Mishra et al., 2012). Further detail on the catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

The NOAA Environmental Sensitivity Index (ESI) ranks shorelines according to their sensitivity to oil, the natural persistence of oil, and the expected ease of cleanup after an oil spill. These factors affect the impacts of oil spills in coastal and estuarine areas (USDOI, MMS, 2010). According to the ESI, the most sensitive shoreline types (i.e., sheltered tidal flats, vegetated low banks, salt/brackish-water marshes, freshwater marshes/swamps, and scrub-shrub wetlands) tend to accumulate oil and are difficult to clean, thus causing oil to persist in these coastal and estuarine areas (USDOI, MMS, 2010).

In the case of catastrophic spills in the GOM, preemptive oil-response strategies would be initiated and include the deployment of oil booms, skimmer ships, and barge barriers to protect the beaches and adjacent wetlands. Boom deployment must also include plans for monitoring and maintaining the protective boom systems to assure that these systems are installed and functioning properly and that they are not damaging the wetlands they are trying to protect. In most cases, the beach face would take the most oil; however, in areas where the marsh is immediately adjacent to the beach face or embayments, or in the case of small to severe storms, marshes would be oiled. Severe weather could push oil into the tidal pools and back beach areas that support tidal marsh vegetation.

The primary factors that affect vegetation responses to oil are toxicity of the oil and extent of plant coverage, amount of contact with and penetration of the soil, plant species affected, oiling frequency, season, and cleanup activities (Mendelssohn et al., 2012). Previous studies of other large spills have shown that, when oil has a short residence time in the marsh and it is not incorporated into the sediments, the marsh vegetation has a high probability of survival, even though aboveground die-off of marsh vegetation may occur (Lin et al., 2002). However, if re-oiling occurs after the new shoots from an initial oiling are produced, such that the new shoots are killed, then the marsh plants may not have enough stored energy to produce a second round of new shoots. Other studies noted the utilization of dispersants in the proper dosages results in a reduction in marsh damage from oiling (Lin and Mendelssohn, 2009). The works of several investigators (Webb et al., 1981 and 1985; Alexander and Webb, 1983 and 1987; Lytle, 1975; Delaune et al., 1979; Fischel et al., 1989) evaluated the effects of potential spills to area wetlands. For wetlands along the central Louisiana coast, the critical oil concentration is assumed to be 0.025 gallons per ft^2 (1.0 liter per m^2) of marsh. Concentrations less than this may cause diebacks for one growing season or less, depending upon the concentration and the season during which contact occurs. The duration and magnitude of a spill resulting from a catastrophic blowout could result in concentrations above this critical level and would result in longer term effects to wetland vegetation, including some plant mortality and loss of land.

Due to the distance of deep water from shore, the possibility of a spill from a deepwater blowout reaching coastal wetlands with the toxicity to significantly impact the coastal wetlands is low because of the response procedures implemented during a catastrophic spill. (It is assumed that oil would reach shore within 2-4 weeks.) Therefore, a spill from a shallow-water blowout is more likely to contribute to wetland damage. However, for the few deepwater areas that are located closer to shore, such as in the Mississippi Canyon Area, the amount of time before shoreline contact could occur could be estimated to be the same as the estimate given for the shallow-water scenario, i.e., 1-3 weeks.

Offshore skimming, burning, and dispersal treatments for the oil near the spill site would result in capture, detoxification, and dilution of the majority of oil spilled. The utilization of nearshore booming protection for beaches and wetlands could also help to reduce oiling of these resources, if done correctly. Booms deployed adjacent to marsh shorelines can be lifted by wave action onto marsh vegetation, resulting in plant mortality under the displaced booms. After the *Deepwater Horizon* explosion and oil spill, the use of barriers such as booms and sand berms did not work as well as planned (Martinez et al., 2011; Jones and Davis, 2011; Zengel and Michel, 2013). The activity of oil cleanup can result in additional impacts on wetlands if not done properly. During the *Deepwater Horizon* explosion, oil spill, and response, aggressive onshore and marsh cleanup methods (such as the removal by mechanized equipment, in-situ burning, etc.) were not extensively utilized. The severity of oiling is the main factor that dictates the appropriate marsh cleanup method to be utilized (refer to **Table B-4**).

Phase 4—Post-Spill, Long-Term Recovery and Response

Wetlands serve a number of important ecological functions. For example, Louisiana's coastal wetlands support more than two-thirds of the wintering waterfowl population of the Mississippi Flyway (Louisiana Department of Wildlife and Fisheries, 2012). Therefore, loss of wetlands would also impact a significant portion of the waterfowl population. Another important ecological function of wetlands is their use as a nursery for estuarine-dependent species of fish and shellfish. Wetland loss would reduce the available nursery habitat.

The duration and magnitude of a spill resulting from a catastrophic blowout could result in high concentrations of oil that would result in long-term effects to wetland vegetation, including some plant mortality and loss of land. Silliman et al. (2012) found that after the *Macondo* well blowout and spill, oil coverage of Louisiana salt marshes was primarily concentrated on their seaward edges. Oil-driven plant death on the edges of these marshes more than doubled the rates of shoreline erosion, further driving marsh platform loss that is likely to be permanent. Eighteen months after the *Macondo* well blowout and spill, in previously oiled, noneroded areas, marsh grasses had largely recovered, and the elevated shoreline retreat rates observed at oiled sites had decreased to levels at reference marsh sites. Studies of impacted wetlands have demonstrated that wetlands can recover from the impacts of oil spills, but the recovery process varies from extremely slow in mangrove swamps (Burns et al., 1993 and 1994) to relatively rapid in grass-dominated marshes subject to in-situ burning of oil (Baustian et al., 2010).

Land loss caused by the oiling of wetlands would add to continuing impacts of other factors, such as hurricanes, subsidence, saltwater intrusion, and sea-level rise. The wetlands along the Gulf Coast have already been severely damaged by the 2005 and 2008 hurricane seasons, leaving the mainland less protected. It was estimated in 2000 that coastal Louisiana would continue to lose land at a rate of approximately 2,672 hectares/year (10 mi^2/year) over the next 50 years. Further, it was estimated that an additional net loss of 132,794 hectares (512 mi^2) may occur by 2050, which is almost 10 percent of Louisiana's remaining coastal wetlands (Barras et al., 2003). Barras (2006) indicated an additional 562 km^2 (217 mi^2) of land lost during the 2005 hurricane season. A catastrophic spill occurring nearshore would contribute further to this landloss. Following Hurricanes Katrina and Rita, another series of hurricanes (Gustav and Ike) made landfall along the Louisiana and Texas coasts in September 2008. Hurricane Gustav made landfall as a Category 2 storm near Cocodrie, Louisiana, pushing large surges of saline water into the fresh marshes and coastal swamps of Louisiana from Grand Isle westward. While Hurricane Gustav did not impact the quantity of wetlands that Hurricanes Katrina and Rita impacted, it did have a severe and continuing effect on the coastal barrier islands and the wetlands associated with backshore (back of the island) and foreshore (front of the island). While Hurricane Gustav affected the eastern portion of the Louisiana coast closer to Grand Isle and Houma, Hurricane Ike concentrated on Louisiana's western coast. The Texas coast received the brunt of Hurricane Ike where it made landfall slightly east of Galveston. The storm surge heavily eroded the dune systems and significantly lowered the beach elevations along the eastern portion of the Texas coast near Galveston and the Bolivar Peninsula. The erosion and wash-over associated with Hurricane Ike's tidal surge breeched beach ridges and opened the inland freshwater ponds and their associated wetlands to the sea. As a result of the four successive storms, the Louisiana and Texas coasts have lost protective elevations, barrier islands, and wetlands, and they now have the potential for transitioning to a less productive salt-marsh system in areas where fresh-marsh systems once existed. In addition, the loss of these protective elevations has increased the vulnerability of coastal wetlands to catastrophic oil-spill events.

A poorly executed oil cleanup can result in additional impacts. Aggressive onshore and marsh cleanup methods (such as removal by mechanized equipment, in-situ burning, marsh cutting, and foot entry into the marsh for manual removal) probably would not be initiated until the oil spill has been stopped. Depending on the marsh remediation methods used, further impacts to the wetlands may occur from cleanup activities. Zengel and Michel (2013) found that, while natural recovery was the preferred response for the vast majority of oiled salt marsh shorelines, the most effective treatment of the ~1 percent most heavily oiled shorelines was a treatment that involved mechanized grappling, vegetation raking and cutting, and scraping. Careful use of walk boards reduced the impact of the response to the marsh vegetation. Follow-up work showed that mechanical treatment followed by vegetation planting was the most effective in restoring the marsh (Zengel et al., 2014). Boat traffic in marsh areas from the thousands of response vessels associated with a catastrophic spill would produce an incremental increase in erosion rates, sediment resuspension, and turbidity (i.e., an adverse but not significant impact to coastal wetland and seagrass habitats).

Overall Summary and Conclusion (Phases 1-4)

A spill from a catastrophic blowout could impact a few to several hundred square kilometers of wetland shoreline depending on the depth of inland penetration (Burdeau and Collins, 2010; Mishra et al., 2012). This would vary from moderate to heavy oiling. Impacts to wetlands would vary according to the severity of the oiling. The duration and magnitude of the spill could result in severe oiling of wetlands in some areas, causing long-term effects to wetland vegetation, including some plant mortality and loss of land.

B.3.1.5. Seagrass Communities

Phase 1—Initial Event

There would likely be no adverse impacts to submerged vegetation as a result of the events and the potential impact-producing factors that could occur throughout Phase 1 of a catastrophic spill event because of the likely distance from the spill event to the nearest submerged vegetation beds.

Phase 2—Offshore Spill

There would likely be no adverse impacts to submerged vegetation as a result of the events and the potential impact-producing factors that could occur throughout Phase 2 of a catastrophic spill because of the likely distance from the spill event to the nearest submerged vegetation beds.

Phase 3—Onshore Contact

According to the most recent and comprehensive data available, approximately 500,000 hectares (1.25 million acres; 505,857 hectares) of submerged seagrass beds are estimated to exist in exposed, shallow coastal waters and embayments of the northern Gulf of Mexico, and over 80 percent of this area is in Florida Bay and Florida coastal waters (calculated from Handley et al., 2007). Submerged vegetation distribution and composition depend on an interrelationship among a number of environmental factors that include water temperature, depth, turbidity, salinity, turbulence, and substrate suitability (Kemp, 1989; Onuf, 1996; Short et al., 2001). Marine seagrass beds generally occur in shallow, relatively clear, protected waters with predominantly sand bottoms (Short et al., 2001). Freshwater submerged aquatic vegetation (SAV) species occur in the low-salinity waters of coastal estuaries (Castellanos and Rozas, 2001). Seagrasses and freshwater SAVs provide important nursery and permanent habitat for sunfish, killifish, immature shrimp, crabs, drum, trout, flounder, and several other nekton species, and they provide a food source for species of wintering waterfowl and megaherbivores (Rozas and Odum, 1988; Rooker et al., 1998; Castellanos and Rozas, 2001; Heck et al., 2003; Orth et al., 2006). Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

If oil comes into areas with submerged beds, increased water turbulence from waves, storms, or vessel traffic could break apart the surface oil sheen and disperse some oil into the water column or mix oil with sediments that would settle and coat an entire plant. Coating of the plat from the oil and sediment

mixture would cause reduced chlorophyll production and could lead to a decrease in vegetation (Teal and Howarth, 1984; Burns et al., 1994; Erftemeijer and Lewis, 2006). This coating situation also happens when oil is treated with dispersants because the dispersants break down the oil and it sinks into the water column (Thorhaug et al., 1986; Runcie et al., 2004). However, as reviewed in Runcie et al. (2004), oil mixed with dispersants has shown an array of effects on seagrass depending on the species and dispersant used. With a greater distance from shore, there is a greater chance of the oil being weathered by natural and mechanical processes by the time it reaches the nearshore habitat.

Depending on the species and environmental factors (e.g., temperature and wave action), seagrasses may exhibit minimal impacts, such as localized loss of pigmentation, from a spill; however, communities residing within the beds could accrue greater negative outcomes (den Hartog and Jacobs, 1980; Jackson et al., 1989; Kenworthy et al., 1993; Taylor et al., 2006). Community effects could range from either direct mortality due to smothering or indirect mortality from loss of food sources and habitat to a decrease in ecological performance of the entire system depending on the severity and duration of the spill event (Zieman et al., 1984).

Prevention and cleanup efforts could also affect the health of submerged vegetation communities (Zieman et al., 1984). Many physical prevention methods such as booms, barrier berms, and diversions can alter hydrology, specifically changing salinity and water clarity. These changes would harm certain species of submerged vegetation because they are tolerant to specific salinities and light levels (Zieman et al., 1984; Kenworthy and Fonseca, 1996; Frazer et al., 2006). With cleanup, there is increased boat and human traffic in these sensitive areas that generally are protected from this degree of human disturbance prior to the response. Increased vessel traffic would lead to elevated water turbidity and increased propeller scarring. While the elevated levels of water turbidity from vessels would be short-term and the possible damages from propellers could be longer, both events would be localized during the prevention and cleanup efforts (Zieman, 1976; Dawes et al., 1997).

Phase 4—Post-Spill, Long-Term Recovery and Response

According to the most recent and comprehensive data available, approximately 500,000 hectares (1.25 million acres; 505,857 hectares) of submerged seagrass beds are estimated to exist in exposed, shallow coastal waters and embayments of the northern Gulf of Mexico, and over 80 percent of this area is in Florida Bay and Florida coastal waters (calculated from Handley et al., 2007). Submerged vegetation distribution and composition depend on an interrelationship among a number of environmental factors that include water temperature, depth, turbidity, salinity, turbulence, and substrate suitability (Kemp, 1989; Onuf, 1996; Short et al., 2001). Seagrasses and freshwater SAVs provide important nursery and permanent habitat for sunfish, killifish, immature shrimp, crabs, drum, trout, flounder, and several other nekton species, and they provide a food source for species of wintering waterfowl and megaherbivores (Rozas and Odum, 1988; Rooker et al., 1998; Castellanos and Rozas, 2001; Heck et al., 2003; Orth et al., 2006).

A source of potential long-term impacts to submerged beds from a catastrophic spill event is the possibility of buried or sequestered oil becoming resuspended after a disturbance, which would have similar effects as the original oiling event. This could occur in the event of hurricane impacts, which exacerbate the problem with numerous other short-terms stresses, such as turbidity, abrasion, breakage, uprooting SAV and seagrasses, and the alteration of bottom profiles and hydrology. Because different species have different levels of sensitivity to oil, it is difficult to compare studies and extrapolate what variables caused the documented differences in vegetation and community health (Thorhaug et al., 1986; Runcie et al., 2004). In general, studied seagrasses did not show significant negative effects from an oil spill (den Hartog and Jacobs, 1980; Kenworthy et al., 1993; Taylor et al., 2006 and 2007).

If bays and estuaries accrue oil, there is an assumption that there would be a decrease in seagrass cover and negative community impacts. Submerged vegetation serves important ecological functions. For example, seagrasses and freshwater SAVs provide important habitat and are a food source for a wide range of species in multiple life history stages (Castellanos and Rozas, 2001; Short and Coles, 2001; Caldwell, 2003). Therefore, loss of submerged vegetation would adversely impact these species with a loss of valuable habitat and food.

Overall Summary and Conclusion (Phases 1-4)

Because of the likely distance of an initial catastrophic spill event to submerged vegetation communities, there would be no adverse impacts to submerged vegetation resulting from the initial event (Phase 1). Also, with regards to an offshore spill event, there would likely be no adverse impacts to submerged vegetation before the spill reaches shore (Phase 2). An estimated probability of oil contacting its coastline from the CPA example OSRA run can be found in Appendix C of the CPA 235/241/247 Supplemental EIS (Phase 3). It is assumed when these coastlines are contacted with oil, all associated habitat are considered oiled. If oil comes into areas with submerged beds, oil mixed with sediments or with dispersants could settle and coat an entire plant and could cause reduced chlorophyll production and could lead to a decrease in vegetation. Depending on the species and environmental factors (e.g., temperature and wave action), seagrasses may exhibit minimal impacts, such as localized loss of pigmentation, from an oil spill; however, communities residing within the beds could accrue greater negative outcomes. Increased vessel traffic from cleanup efforts would lead to elevated water turbidity and increased propeller scarring. A source of potential long-term impacts to submerged beds from a catastrophic spill event is the possibility of buried or sequestered oil becoming resuspended after a disturbance, which would have similar effects as the original oiling event (Phase 4). While there are impacts on submerged vegetation from an oiling event, the probabilities of an event to occur and contact coastlines are generally low and any impacts that can occur depend on a variety of factors (e.g., plant species, oil type, current environmental conditions, etc.). In general, studied seagrasses did not show significant negative effects from a spill (den Hartog and Jacobs, 1980; Kenworthy et al., 1993; Taylor et al., 2006 and 2007).

B.3.1.6. Live Bottoms (Pinnacle Trend and Low Relief)

The Gulf of Mexico has hard bottom features upon which encrusting and epibenthic organisms attach on the continental shelf in water depths less than 300 m (984 ft). Live bottom features occur in the northeastern portion of the CPA and in the EPA. The Pinnacle Trend is located in the northeastern portion of the central Gulf of Mexico at the outer edge of the Mississippi-Alabama shelf between the Mississippi River and De Soto Canyon. Live bottom (Pinnacle Trend) features are defined in NTL 2009-G39 as "small, isolated, low to moderate relief carbonate reefal features or outcrops of unknown origin or hard substrates exposed by erosion that provide area for the growth of sessile invertebrates and attract large numbers of fish." Fish are attracted to outcrops that provide hard substrate for sessile invertebrates to attach. BOEM does not allow bottom-disturbing activities to occur within 30 m (98 ft) of any hard bottoms/pinnacles in 74 lease blocks in the CPA (each block is typically 3 mi x 3 mi).

Live bottom (low-relief) features are defined in NTL 2009-G39 as "seagrass communities; areas that contain biological assemblages consisting of sessile invertebrates living upon and attached to naturally occurring hard or rocky formations with rough, broken, or smooth topography; and areas where hard substrate and vertical relief may favor the accumulation of turtles, fishes, or other fauna." These features also include the reef communities like those found on the Florida Escarpment. BOEM has stipulations to protect these features from impacts, including bottom-disturbing activity. This chapter discusses the hard substrate, as seagrasses are covered in **Chapter B.3.1.5**.

Phase 1—Initial Event

A blowout from an oil well could result in a catastrophic spill event. A catastrophic blowout would result in released oil rapidly rising to the sea surface because all known reserves in the GOM have specific gravity characteristics that would preclude oil from sinking immediately after release at a blowout site. The oil would surface almost directly over the source location. However, if the oil is ejected under high pressure, micro-droplets of oil may form and become entrained in the water column (Boehm and Fiest, 1982; Adcroft et al., 2010). The upward movement of the oil may be reduced if methane mixed with the oil is dissolved into the water column, reducing the oil's buoyancy (Adcroft et al., 2010). Large oil droplets would rise to the sea surface, but smaller droplets, formed by vigorous turbulence in the plume or the injection of dispersants, may remain neutrally buoyant in the water column, creating a subsurface plume (Adcroft et al., 2010; Joint Analysis Group, 2010). Dispersed oil in the water

column begins to biodegrade and may flocculate with particulate matter, promoting sinking of the particles. Subsea plumes or sinking oil on particulates may contact live bottom features.

A catastrophic blowout outside the well casing and below the seafloor or at the seafloor-water interface could resuspend large quantities of bottom sediments and create a large crater, destroying many organisms within a few hundred meters of the wellhead. Some fine sediment could travel up to a few thousand meters before redeposition, negatively impacting a localized area of benthic communities. If a blowout were to occur close enough to a live bottom feature, suspended sediment may impact the organisms living on the feature.

A catastrophic blowout that occurs above the seabed (at the rig, along the riser between the seafloor and sea surface, or through leak paths on the BOP/wellhead) would not disturb the sediment.

The use of subsea dispersants would increase the exposure of offshore benthic habitats to dispersed oil droplets in the water column, as well as the chemicals used in the dispersants. The use of subsea dispersants is not likely to occur for seafloor blowouts outside the well casing.

Impacts to Live Bottom Features

Impacts that occur to benthic organisms on live bottom features as a result of a blowout would depend on the type of blowout, distance from the blowout, relief of the biological feature, and surrounding physical characteristics of the environment (e.g., turbidity). The distancing of bottom-disturbing activities from Pinnacle and live bottom, low-relief features helps to prevent blowouts in the immediate vicinity of a live bottom feature or its associated biota. Much of the oil released from a blowout would rise to the sea surface, therefore minimizing the impact to benthic communities by direct oil exposure. However, small droplets of oil that are entrained in the water column for extended periods of time may migrate into areas that have live bottom features. Although these small oil droplets will not sink themselves, they may attach to suspended particles in the water column and then be deposited on the seafloor (McAuliffe et al., 1975). The resultant long-term impacts, such as reduced recruitment success, reduced growth, and reduced coral or other epibenthic cover, as a result of impaired recruitment, are discussed in Phase 4 ("Post-Spill, Long-Term Recovery and Response"). Also, if the blowout were to occur beneath the seabed, suspension and subsequent deposition of disturbed sediment may smother localized areas of live bottom communities.

Following a catastrophic, subsurface blowout, benthic communities on a live bottoms exposed to large amounts of resuspended and then deposited sediments could be subject to sediment suffocation, exposure to resuspended toxic contaminants and to reduced light availability. Impacts to fauna found on hard bottoms as a result of sedimentation would vary based on species, the height to which the organism grows, degree of sedimentation, length of exposure, burial depth, and the organism's ability to clear the sediment. Impacts may range from sublethal effects (such as reduced or slower growth, alteration in form, and reduced recruitment and productivity) to suffocation and death (Rogers, 1990; Fucik et al., 1980).

The initial blowout impact would be greatest to communities located in clear waters that experience heavy sedimentation. The most sensitive organisms are typically elevated above soft sediments, making them less likely to be buried, and it is unlikely that corals would experience heavy sedimentation because they are located within Live Bottom (Low Relief) Stipulation blocks that distance bottom-disturbing activity from the features. None of the Live Bottom Stipulation blocks were included in the current proposed lease sale, farther distancing oil and gas activity from live bottoms. In addition, BOEM conducts case-by-case reviews of plans submitted by operators to ensure that the proposed activity will not impact sensitive seafloor features. It is possible, however, for some live bottoms to experience some turbidity or sedimentation impacts from a blowout if they are downstream of a current transporting sediment. Corals may experience discoloration or bleaching as a result of sediment exposure, although recovery from such exposure may occur within 1 month (Wesseling et al., 1999).

Initial impacts would be much less extreme in a turbid environment (Rogers, 1990). For example, the Pinnacle Trend community exists in a relatively turbid environment, starting just 65 km (37 mi) east of the mouth of the Mississippi River and trending to the northeast, and many low-relief live bottoms are frequently covered with a thin sand veneer that moves with waves and bottom currents, exposing and covering up areas with movement (Phillips et al., 1990; Gittings et al., 1992). Sediment from a blowout, if it occurred nearby, may have a reduced impact on these communities compared with an open-water reef community, as these organisms are more tolerant of suspended sediment (Gittings et al., 1992). Many of

the organisms that predominate in this community also grow tall enough to withstand the sedimentation that results from their turbid environment or have flexible structures that enable the passive removal of sediments (Gittings et al., 1992). Those organisms that have a lesser relief could experience sedimentation, abrasion, and suffocation. However, many organisms present in the lower relief, live bottom habitat are motile, can burrow in the sediment, or have mechanisms for dealing with turbidity and can be tolerant of short-term high turbidity events. For example, bivalves can reduce their filtration rates if the suspended sediment concentrations become elevated and can reject excess sediment through pseudofeces (Clarke and Wilber, 2000). Many crustaceans are able to tolerate high levels of suspended sediment; for example, crabs and shrimp spend a portion of their lives in estuaries and nearshore waters that are turbid (Wilber et al., 2005). These organisms are also able to move away from turbid areas that have sediment concentrations that become too high (Clarke and Wilber, 2000; Wilber et al., 2005). Oysters, on the other hand, are not able to move away from turbidity, but they are tolerant of this environmental factor as they tend to live near the mouths of rivers that deposit sediment into their habitat (Wilber et al., 2005). Many of these organisms can also rapidly repopulate an area affected by sedimentation (Fucik et al., 1980).

A portion or the entire rig may sink to the seafloor as a result of a blowout. The benthic features and communities upon which the rig settles would be destroyed or smothered. Encrusting organisms would be crushed by a rig if it lands on a live bottom feature. A settling rig may suspend sediments, which may smother nearby benthic communities if the sediment is redeposited on sensitive features. The habitats beneath the rig may be permanently lost; however, the rig itself may become an artificial reef upon which epibenthic organisms may settle. The surrounding benthic communities that were smothered by sediment would repopulate from nearby stocks through spawning recruitment and immigration if the hard substrate upon which they live was not physically destroyed. Destruction of a live bottom community by a sinking rig is highly unlikely because BOEM requires infrastructure to be distanced from live bottoms.

Phase 2—Offshore Spill

A spill from a shallow-water blowout could impact benthic communities on the continental shelf because of the blowout's proximity to these habitats. The scenario (**Table B-4**) for a catastrophic spill on the continental shelf is assumed to last 2-5 months and to release 30,000 bbl per day. A total volume of 0.9-3.0 MMbbl of South Louisiana midrange paraffinic sweet crude oil could be released, which will float (APIº >10). An anticipated 35,000 bbl of dispersant may be applied to the surface waters.

A spill from a deepwater blowout could also impact shelf communities if surface oil is transported to these areas. The scenario (**Table B-4**) for a catastrophic spill in deep water is assumed to last 4-6 months and to release 30,000-60,000 bbl per day. A total volume of 2.7-7.2 MMbbl of South Louisiana midrange paraffinic sweet crude oil will be released, which will float (APIº >10). Oil properties may change as it passes up the well and through the water column, and it may become emulsified. An anticipated 33,000 bbl of dispersant may be applied to the surface waters and 16,500 bbl may be applied subsea. Weathering and dilution of the oil will also occur as it travels from its release point. It is unlikely that a subsurface plume from a deepwater blowout would impact shelf communities. The oil is anticipated to remain in deep water and to be directed by water currents in the deep water. These currents do not typically transit from deep water up onto the shelf (Pond and Pickard, 1983; Inoue et al., 2008).

Impacts to Live Bottom Features

Impacts from Surface Oil

Sensitive live bottom communities can flourish on hard bottoms in the Gulf of Mexico. The eastern Gulf of Mexico contains scattered, low-relief live bottoms, including areas of flat limestone shelf rock and the Pinnacle Trend area, located on the Mississippi Alabama continental shelf, which includes low- and high-relief features that are 60-120 m (197-394 ft) below the sea surface. The depth at which Pinnacles and most live bottom, low-relief features flourish below the sea surface helps to protect these habitats from a surface oil spill. Rough seas may mix the oil into subsurface water layers, where it may impact sessile biota. In general, the longer the seas are rough, the greater the amount of oil from a surface slick would be mixed into the water column. Silva et al. (2015) hypothesize that unusually strong wave action from Tropical Storm Bonnie in July 2010 may have submerged injurious amounts of surface oil from the *Deepwater Horizon* oil spill to depths of at least 75 m (246 ft) and caused the documented coral

pathologies in the Pinnacles Trend area. The submerged oil likely reached the live bottom features in relatively undiluted concentrations, leading to lethal and sublethal impacts. This result, though demonstrably possible, required a highly unusual combination of conditions in order to occur: (1) a very large amount of surface oil associated with a catastrophic level spill event; and (2) unusually strong winds and surface waves that are only expected during tropical storm-level weather. Therefore, though this result is noteworthy and demonstrably possible, it likely represents an extreme case that would not normally be expected under normal meteorological and oceanographic conditions. Under more typical conditions, measurable amounts of oil have been documented to mix from the surface down to a 10-m (33-ft) depth, although modeling exercises have indicated such oil may reach a depth of 20 m (66 ft). At this depth, however, the oil is found at concentrations several orders of magnitude lower than the amount shown to have an effect on corals and other benthic organisms (Lange, 1985; McAuliffe et al., 1975 and 1981a; Knap et al., 1985; Scarlett et al., 2005; Hemmer et al., 2010; George-Ares and Clark, 2000). Low-relief, live bottom habitats located in shallow coastal water may be at greater risk of surface oil mixing to the depth where their active growth occurs; however, because oil and gas activities currently take place far from the coastlines where nearshore live bottoms are located, the surface oil will be well dispersed and diluted by the time it reaches waters above the shallow live bottoms. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

Impacts from Subsurface Oil

The presence of a subsurface oil plume on the continental shelf from a shallow-water blowout may affect benthic communities on live bottom features. A majority of oil released is expected to rise rapidly to the sea surface above the release point because of the specific gravity characteristics of the oil reserves in the GOM, thus not impacting sensitive benthic communities. If oil is ejected under high pressure, oil droplets may become entrained in the water column (Boehm and Fiest, 1982; Adcroft et al., 2010). The upward movement of the oil may be reduced if methane mixed with the oil is dissolved into the water column, reducing the oil's buoyancy (Adcroft et al., 2010). Large oil droplets would rise to the sea surface, but smaller droplets, formed by vigorous turbulence in the plume or the injection of dispersants, may remain neutrally buoyant in the water column, creating a subsurface plume (Adcroft et al., 2010; Joint Analysis Group, 2010). Dispersed oil in the water column begins to biodegrade and may flocculate with particulate matter, promoting sinking of the particles. A sustained spill would continuously create surface slicks and possibly subsurface spill plumes. Some of the oil in the water column will become diluted or evaporated over time, reducing any localized transport to the seafloor (Vandermeulen, 1982). In addition, microbial degradation of the oil occurs in the water column so that the oil would be less toxic as it travels from the source (Hazen et al., 2010). However, subsurface plumes generated by high-pressure dissolution of oil may come in contact with live bottom habitats, and a sustained spill may result in elevated exposure concentrations to benthic communities if the plume reaches them. The longer the spill takes to stop, the longer the exposure time and the higher the exposure concentration may be.

Live bottom, low-relief features have a greater chance of being impacted by subsea plumes than some Pinnacle features because currents may sweep around the larger features, as they do with topographic features (Rezak et al., 1983; McGrail, 1982). The lower relief live bottoms (including low-relief features in the Pinnacle Trend) may fall in the path of the plume because the feature is not large enough to divert a current. Low-level exposures of organisms to oil from a subsea plume may result in chronic or temporary impacts. For example, feeding activity or reproductive ability may be reduced when coral is exposed to low levels of oil; however, impacts may be temporary or unable to be measured over time. Experiments indicated that oil exposure reduced the normal feeding activity of coral, and oiled reefs produced smaller gonads than unoiled reefs, resulting in reproductive stress (Lewis, 1971; Guzmán and Holst, 1993). In addition, photosynthesis and growth may be reduced with oil exposure, and petroleum may be incorporated into coral tissue (Cook and Knap, 1983; Dodge et al., 1984; Burns and Knap, 1989; Knap et al., 1982; Kennedy et al., 1992). Sublethal responses of other marine invertebrates on live bottoms may result in population level changes (Suchanek, 1993) at concentrations as low as 1-10 ppb (Hyland and Schneider, 1976). Sublethal impacts may include reduced feeding rates, reduced ability to detect food, erratic movement, ciliary inhibition, tentacle retraction, reduced movement, decreased aggression, and altered respiration (Scarlett et al., 2005; Suchanek, 1993). Embryonic life stages of benthic organisms may experience toxic effects at lower levels than adult stages (Fucik et al., 1995; Suchanek, 1993; Beiras and Saco-Álvarez, 2006; Byrne, 1989).

It is unlikely that a subsurface plume from a deepwater blowout would impact live bottom shelf communities. The oil is anticipated to remain in deep water and be directed by water currents in the deep water. These currents do not typically transit from deep water up onto the shelf (Pond and Pickard, 1983; Inoue et al., 2008).

Impacts from Dispersed Oil

If dispersants are used at the sea surface, oil may mix into the water column. If applied subsea, they can travel with currents through the water, and they may contact or settle on sensitive features. Note that, as indicated above, a deepwater plume would not travel onto the continental shelf, but a plume formed on the continental shelf could impact live bottom features. If near the source, the dispersed oil could be concentrated enough to harm the community. If the oil remains suspended for a longer period of time, it would be more dispersed and present at lower concentrations. Reports on dispersant usage on surface oil indicate that a majority of the dispersed oil typically remains in the top 10 m (33 ft) of the water column, with 60 percent of the oil in the top 2 m (6 ft) (McAuliffe et al., 1981a). However, Silva et al. (2015) present evidence that unusually rough seas associated with Tropical Storm Bonnie in July 2010 may have submerged large amounts of oil at the surface and in the upper water column following the *Deepwater Horizon* oil spill in 2005. The authors conclude that this mechanism may have led to acute exposure of several species of octocorals to toxic oil at two mesophotic coral communities in the Pinnacle Trend area, causing the documented lethal and sublethal impacts.

Dispersant usage also reduces the oil's ability to stick to particles in the water column, minimizing oil adhering to sediments and traveling to the seafloor (McAuliffe et al., 1981a). There is very little information on the mixing and dispersion of subsea dispersants.

Dispersed oil reaching live bottoms in the Gulf of Mexico would be expected to occur at very low concentrations (<1 part per million [ppm]) (McAuliffe et al., 1981a). Such concentrations would not be life threatening to larval or adult stages at this depth below the sea surface based on experiments conducted with benthic organisms. Any dispersed oil in the water column that comes in contact with live bottoms may evoke short-term negative responses by the organisms (Wyers et al., 1986; Cook and Knap, 1983; Dodge et al., 1984; Scarlett et al., 2005; Renzoni, 1973).

The impact of dispersants on benthic organisms is dependent on the dispersant used, length of exposure, and the physical barriers the organism has to protect itself from the dispersant. Organisms with shells appear to be more tolerant of dispersants than those with only a tissue barrier (Scarlett et al., 2005). In addition, organisms that produce mucus, such as coral, have an elevated tolerance for oil exposure (Mitchell and Chet, 1975; Ducklow and Mitchell, 1979). Concentrations of 100 ppm and 1,000 ppm oil plus dispersant in a ratio of 4:1 were necessary for oyster and mussel fertilization and development to become reduced when the larvae was exposed to the mixture (Renzoni, 1973). After 48 hours of exposure to dispersants, the blue mussel (*Mytilus edulis*) died at dispersant concentrations of 250 ppm, although reduced feeding rates were observed at 50 ppm (Scarlett et al., 2005). The snakelocks anemone (*Anemonia viridis*), which does not have a protective shell, was much more sensitive to dispersants. It retracted its tentacles and failed to respond to stimuli after 48 hours of exposure to 40 ppm dispersant (Scarlett et al., 2005). Corals exposed to dispersed oil showed mesenterial filament extrusion, extreme tissue contraction, tentacle retraction, localized tissue rupture, and reduced photosynthesis (Wyers et al., 1986; Cook and Knap, 1983). Respiratory damage to organisms does not appear to be reversible; however, if the exposure is short enough, nervous system damage may be reversed and organisms may recover (Scarlett et al., 2005). Experiments using both anemones and corals showed recovery after exposure to dispersants (Scarlett et al., 2005; Wyers et al., 1986).

Concentrations used in historical experiments are generally much higher than the exposure that would occur in the field (Renzoni, 1973; George-Ares and Clark, 2000). Although historical experiments seem to indicate that the toxicity of oil increases with the addition of the dispersant, the toxicity of the oil actually remains the same as it was when it was not dispersed, but exposure increases due to the dispersed components of the oil (George-Ares and Clark, 2000). However, the increase of oil into the water column with the addition of dispersants is temporary, as the dispersed oil is more easily diluted with the surrounding water and biodegraded by bacteria (George-Ares and Clark, 2000). Therefore, concentrated dispersants are not anticipated to reach live bottoms, and any impacts that do occur should be sublethal and temporary.

Impacts from Oil Adhering to Sediments

BOEM's policy, described in NTL 2009-G39, prevents wells from being placed immediately adjacent to sensitive communities. In the event of a seafloor blowout, however, some oil could be carried to live bottoms as a result of oil droplets adhering to suspended particles in the water column. Oiled sediment that settles to the seafloor may affect organisms attached to hard-bottom substrates. Impacts may include reduced recruitment success, reduced growth, and reduced benthic cover as a result of impaired recruitment. Experiments have shown that the presence of oil on available substrate for larval coral settlement has inhibited larval metamorphosis and larval settlement in the area. Oil exposure also increased the number of deformed polyps after metamorphosis occurred (Kushmaro et al., 1997). In addition, exposure to oiled sediment has also been shown to reduce the growth rate of clams (Dow, 1975).

The majority of organisms exposed to sedimented oil, however, are anticipated to experience only low-level concentrations, particularly because oiled sediments would have been widely dispersed before settling to the seafloor. Many organisms on live bottoms will be able to protect themselves from low levels of oiled sediment that may settle out of the water column. Organisms with shells will not experience direct contact with the oil, and mobile organisms will be able to move away from areas where oiled sediment has accumulated. Coral may also be able to protect itself from low concentrations of sedimented oil that settles from the water column through mucus that will not only act as a barrier to protect coral from the oil in the water column but which also been shown to aid in the removal of oiled sediment on coral surfaces (Bak and Elgershuizen, 1976). In addition, because many organisms in live bottom habitats are tolerant of turbidity and sedimentation, slight addition of sediment to the area should not impact survival.

Impacts from Oil-Spill Response Activity

Oil-spill-response activity may also impact sessile benthic features. Booms anchored to the seafloor are sometimes used to control the movement of oil at the water surface. Boom anchors can physically impact sessile benthic organisms, especially when booms are moved around by waves (USDOC, NOAA, 2010d). Vessel anchorage and decontamination stations set up during response efforts may also break or kill live bottoms that have unmapped locations if anchors are set on the habitat. Injury to live bottom habitat as a result of anchor impact may result in long-lasting damage or failed recovery. Effort should be made to keep vessel anchorage areas as far from sensitive benthic features as possible to minimize impact.

Drilling muds comprised primarily of barite may be pumped into a well to stop a blowout. If a "kill" is not successful, the mud (possibly tens of thousands of barrels) may be forced out of the well and deposited on the seafloor near the well site. Any organisms beneath the extruded drilling mud would be buried. Based on stipulations as described in NTL 2009-G39, a well should be far enough away from a Pinnacle feature to prevent extruded drilling muds from smothering sensitive benthic communities. However, if drilling muds were to travel far enough or high enough in the water column to contact a sensitive community, the fluid would smother the existing community. Burial may lead to the elimination of a live bottom community.

Phase 3—Onshore Contact

There would likely be no adverse impacts to live bottom features as a result of the events and the potential impact-producing factors that could occur throughout Phase 3 of a catastrophic spill because the live bottom features are located offshore.

Phase 4—Post-Spill, Long-Term Recovery and Response

Live bottoms exposed to large amounts of resuspended sediments following a catastrophic, subsurface blowout could be subject to sediment suffocation, exposure to resuspended toxic contaminants, and reduced light penetration. The greatest impacts would occur to communities that exist in clear water with very low turbidity, such as the live bottoms off Florida. The consequences of a blowout near one of these features could be long lasting, although the occurrence of a blowout near such sensitive communities is unlikely because of stipulations described in NTL 2009-G39, which distances bottom-disturbing activity from live bottom features. In addition, BOEM conducts case-by-case reviews

of submitted plans and pipelines so that sensitive seafloor habitat is avoided. Impacts to a community in more turbid waters, such as those on the Mississippi-Alabama Shelf, would be greatly reduced, as the species are tolerant of suspended sediments, and recovery would occur quicker. Recovery time from sediment exposure would depend on the amount of sediment an organism was exposed to, if an entire population was demolished, and the extent of the loss.

Impacts may also occur from low-level or long-term oil exposure. This type of exposure has the potential to impact live bottom communities, resulting in impaired health. Long-term impacts such as reduced recruitment success, reduced growth, and reduced organism cover as a result of impaired recruitment may occur. Recovery may be fairly rapid from brief, low-level exposures, but it could be much longer if acute concentrations of oil contact organisms. Recovery time would then depend on recruitment from outside populations that were not affected by oiling.

Overall Summary and Conclusion (Phases 1-4)

A catastrophic spill on the continental shelf would have a greater impact on live bottom features than a deepwater spill. Surface oil from a deepwater spill would be weathered and diluted by the time it reaches the surface waters over live bottom features (if it ever reaches them), and it would be unlikely, except in shallow coastal waters or during the most severe storms (e.g., Silva et al., 2015), that it would mix to the depth of the live bottoms in concentrations that could cause toxicity. Subsea plumes formed in deep water would not travel onto the continental shelf because deep-sea currents do not travel up a slope.

A catastrophic blowout and spill on the continental shelf has a greater chance to impact live bottom features. If a blowout on the continental shelf occurs close enough to sensitive features, the organisms may be smothered by settling sediment that is displaced by the blowout. The farther a feature is from the blowout, the lower its chance of being covered with settling sediment or sediment upon which oil adhered. The distancing of oil and gas activity from live bottom features helps to prevent heavy sedimentation, as well as features being crushed by a sinking rig.

In most cases, the impacts from oil would be sublethal. Surface oil is not expected to mix to the zone of active growth, and any oil components that do reach that depth would be at sublethal concentrations. Subsea plumes may contact the live bottom features; however, because currents tend to travel around instead of over large seafloor features, the Pinnacle features should be protected from subsea plumes, while lower relief live bottoms may be impacted. The current oil and gas activity in the GOM, however, is distanced from low-relief live bottoms because no live bottom, low-relief blocks have been leased with the current proposed lease sales. Overall impacts of dispersed oil would be similar to subsea plumes. Spill response activity may impact low-relief, live bottom features if they are unmarked on nautical charts and vessels anchor on the features, but it is doubtful that a vessel would anchor on a marked Pinnacle feature.

Overall, a catastrophic spill would have a fairly low probability of impacting live bottom features because the bottom-disturbing activities of oil and gas activities are distanced from live bottom features within the Live Bottom Stipulation blocks, as described in NTL 2009-G39, and because BOEM conducts a case-by-case review of all plans to ensure that activities do not impact these seafloor features. In addition, the Live Bottom Stipulation blocks have not been leased as part of these proposed lease sales, creating farther distance between oil and gas activities and live bottoms. Also, live bottom features are protected by the limited mixing depth of surface oil compared with the depth of the live bottom features, currents sweeping around larger features, and the weathering and dispersion of oil that would occur with distance from the source as it travels toward the features. Low-relief features could have impacts from a blowout as their relief would not divert currents. In addition, the locations of these features are not all known so accidental anchor impacts may result in breakage of the features and possibly destruction. These low-relief features, however, would be protected by the regulated distance of current oil and gas activities, which increases the chance of oil becoming well dispersed before it reaches the features.

B.3.1.7. Topographic Features

The Gulf of Mexico has a series of topographic features (banks or seamounts) on the continental shelf in water depths less than 300 m (984 ft). Topographic features are isolated areas of moderate to high relief that provide habitat for hard-bottom communities of high biomass and moderate diversity. These features support prolific algae, invertebrate, and fish communities, and they provide shelter and food for

large numbers of commercially and recreationally important fish. There are 37 named topographic features in the Gulf of Mexico with specific BOEM protections, including the Flower Garden Banks. BOEM has created "No Activity Zones" around topographic features in order to protect these habitats from disruption by oil and gas activities. A "No Activity Zone" is a protective perimeter drawn around each feature that is associated with a specific isobath (depth contour) surrounding the feature in which structures, drilling rigs, pipelines, and anchoring are not allowed. These "No Activity Zones" are areas where activity is prohibited based on BOEM's policy. The NTL 2009-G39 recommends that drilling should not occur within 152 m (500 ft) of a "No Activity Zone" of a topographic feature.

Potentially sensitive biological features (PSBFs) are features that have moderate to high relief (8 ft [2 m] or higher), provide hard surface for sessile invertebrates, and attract fish, but they are not located within the "No Activity Zone" of topographic features. These features are frequently located near topographic features. No bottom-disturbing activities that may cause impact to these features are permitted.

Phase 1—Initial Event

A blowout from an oil well could result in a catastrophic spill event. A catastrophic blowout would result in released oil rapidly rising to the sea surface because all known reserves in the GOM have specific gravity characteristics that would preclude oil from sinking immediately after release at a blowout site. The oil would surface almost directly over the source location. However, if the oil is ejected under high pressure, micro-droplets of oil may form and become entrained in the water column (Boehm and Fiest, 1982; Adcroft et al., 2010). The upward movement of the oil may be reduced if methane mixed with the oil is dissolved into the water column, reducing the oil's buoyancy and slowing its rise to the surface (Adcroft et al., 2010). Large oil droplets would rise to the sea surface, but smaller droplets, formed by vigorous turbulence in the plume or the injection of dispersants, may remain neutrally buoyant in the water column, creating a subsurface plume (Adcroft et al., 2010; Joint Analysis Group, 2010). Dispersed oil in the water column begins to biodegrade and may flocculate with particulate matter, promoting sinking of the particles. Subsea plumes or sinking oil on particulates may contact topographic features.

A catastrophic blowout outside the well casing and below the seafloor or at the seafloor-water interface could resuspend large quantities of bottom sediments and create a large crater, destroying many organisms within a few hundred meters of the wellhead. Fine sediment could travel up to a few thousand meters before redeposition, negatively impacting a localized area of benthic communities. If a blowout were to occur near a topographic feature, suspended sediment may impact the organisms living on the lower levels of the topographic feature (since water currents flow around the banks rather than traveling uphill).

A catastrophic blowout that occurs above the seabed (at the rig, along the riser between the seafloor and sea surface, or through leak paths on the BOP/wellhead) would not disturb the sediment.

The use of subsea dispersants would increase the exposure of offshore benthic habitats to dispersed oil droplets in the water column, as well as the chemicals used in the dispersants. The use of subsea dispersants is not likely to occur for seafloor blowouts outside the well casing.

Impacts to Topographic Features

Impacts that occur to benthic organisms on topographic features as a result of a blowout would depend on the type of blowout, distance from the blowout, relief of the biological feature, and surrounding physical characteristics of the environment (e.g., turbidity). The NTL 2009-G39 recommends the use of buffers to prevent blowouts in the immediate vicinity of a topographic feature or its associated biota. Much of the oil released from a blowout would rise to the sea surface, therefore minimizing the impact to benthic communities by direct oil exposure. However, small droplets of oil that are entrained in the water column for extended periods of time may migrate into No Activity Zones that surround the topographic feature. In addition, they may come in contact with PSBFs. Although these small oil droplets will not sink themselves, they may attach to suspended particles in the water column and then be deposited on the seafloor (McAuliffe et al., 1975). The resultant long-term impacts, such as reduced recruitment success, reduced growth, and reduced coral cover as a result of impaired recruitment, are discussed in Phase 4 (Post-Spill, Long-Term Recovery and Response). Also, if the blowout were to

occur beneath the seabed, suspension and subsequent deposition of disturbed sediment may smother localized areas of benthic communities, possibly including organisms within No Activity Zones or on PSBFs.

Benthic communities on a topographic feature or PSBF exposed to large amounts of resuspended and deposited sediments following a catastrophic, subsurface blowout could be subject to sediment suffocation, exposure to resuspended toxic contaminants, and reduced light availability. Impacts to corals as a result of sedimentation would vary based on coral species, the height to which the coral grows, degree of sedimentation, length of exposure, burial depth, and the coral's ability to clear the sediment. Impacts may range from sublethal effects such as reduced growth, alteration in form, and reduced recruitment and productivity to slower growth or death (Rogers, 1990). Corals may also experience discoloration or bleaching as a result of sediment exposure, although recovery from such exposure may occur within 1 month (Wesseling et al., 1999).

The initial blowout impact would be greatest to communities located in clear waters with little suspended sediment that experience heavy sedimentation as a result of the blowout. Reef-building corals are sensitive to turbidity and may be killed by heavy sedimentation (Rogers, 1990; Rice and Hunter, 1992). However, it is unlikely that reef-building corals would experience heavy sedimentation as a result of a blowout because drilling activity is not allowed near sensitive organisms in the No Activity Zones based on the lease stipulations as described in NTL 2009-G39. The most sensitive organisms are also typically elevated above soft sediments, making them less likely to be buried. The lower levels of topographic banks and the PSBFs, which are generally small features with only a few meters of relief, typically experience turbid conditions. Vigorous bottom currents (often generated by storms) frequently resuspend bottom sediments and bathe these features in turbid waters, which results in sedimentation. As a result, the organisms that live in this environment near the seafloor are those adapted to frequent sedimentation.

Initial impacts would be much less extreme in a turbid environment (Rogers, 1990). For example, the South Texas Banks exist in a relatively turbid environment (the Nepheloid Zone). They generally have lower relief than the farther offshore banks at the shelf edge, may have a sediment cover, and exhibit reduced biota. Sediment from a blowout, if it occurred nearby, may have a reduced impact on these communities compared with an open-water reef community, as these organisms are more tolerant of suspended sediment (Gittings et al., 1992). Many of the organisms that predominate in this community also grow tall enough to withstand the sedimentation that results from their turbid environment or have flexible structures that enable the passive removal of sediments (Gittings et al., 1992).

A portion or the entire rig may sink to the seafloor as a result of a blowout. The benthic features and communities upon which the rig settles would be destroyed or smothered. Encrusting organisms would be crushed by a rig if it lands on a topographic feature or PSBF. A settling rig may suspend sediments, which may smother nearby benthic communities if the sediment is redeposited on sensitive features. The habitats beneath the rig may be permanently lost; however, the rig itself may become an artificial reef upon which epibenthic organisms may settle. The surrounding benthic communities that were smothered by sediment would repopulate from nearby stocks through spawning recruitment and immigration if the hard substrate upon which they live was not physically destroyed.

Phase 2—Offshore Spill

A spill from a shallow-water blowout could impact benthic communities on the continental shelf because of the blowout's proximity to these habitats. The scenario (**Table B-4**) for a catastrophic spill on the continental shelf is assumed to last 2-5 months and to release 30,000 bbl per day. A total volume of 0.9-3.0 MMbbl of South Louisiana midrange paraffinic sweet crude oil could be released, which will float (API° >10). An anticipated 35,000 bbl of dispersant may be applied to the surface waters.

A spill from a deepwater blowout could also impact shelf communities if surface oil is transported to these areas. The scenario (**Table B-4**) for a catastrophic spill in deep water is assumed to last 4-6 months and to release 30,000-60,000 bbl per day. A total volume of 2.7-7.2 MMbbl of South Louisiana midrange paraffinic sweet crude oil will be released, which will float (API° >10). Oil properties may change as it passes up the well and through the water column, and it may become emulsified. An anticipated 33,000 bbl of dispersant may be applied to the surface waters and 16,500 bbl may be applied subsea. Weathering and dilution of the oil will also occur as it travels from its release point. It is unlikely that a subsurface plume from a deepwater blowout would impact shelf communities. The oil is anticipated to

remain in deep water and be directed by water currents in the deep water. These currents do not typically transit from deep water up onto the shelf (Pond and Pickard, 1983; Inoue et al., 2008).

Impacts to Topographic Features

Impacts from Surface Oil

Sensitive reef communities flourish on topographic features and PSBFs in the Gulf of Mexico. Their depth below the sea surface helps to protect these habitats from a surface oil spill. Rough seas may mix the oil into subsurface water layers, where it may impact sessile biota. The longer the amount of time the seas are rough, the greater the amount of oil from a surface slick would be mixed into the water column. Measurable amounts of oil have been documented to mix from the surface down to a 10-m (33-ft) water depth, although modeling exercises have indicated such oil may reach a water depth of 20 m (66 ft). At this depth, however, the oil is found at concentrations several orders of magnitude lower than the amount shown to have an effect on corals (Lange, 1985; McAuliffe et al., 1975 and 1981a; Knap et al., 1985). None of the topographic features or PSBFs in the GOM are shallower than 10 m (33 ft), and only the Flower Garden Banks are shallower than 20 m (66 ft). Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 233/241/247 Supplemental EIS.

Impacts from Subsurface Oil

The presence of a subsurface oil plume on the continental shelf from a shallow-water blowout may affect benthic communities on topographic features and PSBFs. A majority of the oil released is expected to rise rapidly to the sea surface above the release point because of the specific gravity characteristics of the oil reserves in the GOM, thus not impacting sensitive benthic communities. If the oil is ejected under high pressure, oil droplets may become entrained in the water column (Boehm and Fiest, 1982; Adcroft et al., 2010). The upward movement of the oil may be reduced if methane mixed with the oil is dissolved into the water column, reducing the oil's buoyancy and slowing its rise to the surface (Adcroft et al., 2010). Large oil droplets would rise to the sea surface, but smaller droplets, formed by vigorous turbulence in the plume or the injection of dispersants, may remain neutrally buoyant in the water column, creating a subsurface plume (Adcroft et al., 2010; Joint Analysis Group, 2010). Dispersed oil in the water column begins to biodegrade and may flocculate with particulate matter, promoting sinking of the particles. Subsurface plumes generated by high-pressure dissolution of oil may come in contact with topographic features and PSBFs. A sustained spill would continuously create surface slicks and possibly subsurface spill plumes. Some of the oil in the water column will become diluted or evaporated over time, reducing any localized transport to the seafloor (Vandermeulen, 1982). In addition, microbial degradation of the oil occurs in the water column so that the oil would be less toxic as it travels from the source (Hazen et al., 2010). However, a sustained spill may result in elevated exposure concentrations to benthic communities if the plume reaches them. The longer the spill takes to stop, the longer the exposure time and higher the exposure concentration may be.

The PSBFs have a greater chance of being impacted by subsea plumes than topographic features because currents tend to sweep around topographic features (Rezak et al., 1983; McGrail, 1982). The lower relief PSBFs may fall in the path of the plume because the feature is not large enough to divert a current. Low-level exposures of corals to oil from a subsea plume may result in chronic or temporary impacts. For example, feeding activity or reproductive ability may be reduced when coral is exposed to low levels of oil; however, impacts may be temporary or unable to be measured over time. Experimental simulations of exposure indicated that normal feeding activity of *Porites porites* and *Madracis asperula* were reduced when exposed to 50 ppm oil (Lewis, 1971). In addition, reefs of *Siderastrea siderea* that were oiled in a spill produced smaller gonads than unoiled reefs, resulting in reproductive stress (Guzmán and Holst, 1993).

Elevated concentrations of oil may be necessary to measure reduced photosynthesis or growth in corals. Photosynthesis of the zooxanthellae in *Diplora strigosa* exposed to approximately 18-20 ppm crude oil for 8 hours was not measurably affected, although other experiments indicate that photosynthesis may be impaired at higher concentrations (Cook and Knap, 1983). Measurable growth of *Diploria strigosa* exposed to oil concentrations up to 50 ppm for 6-24 hours did not show any reduced growth after 1 year (Dodge et al., 1984).

Corals exposed to subsea oil plumes may incorporate petroleum hydrocarbons into their tissue. Records indicate that *Siderastrea siderea*, *Diploria strigosa*, and *Montastrea annularis* accumulate oil from the water column and incorporate petroleum hydrocarbons into their tissues (Burns and Knap, 1989; Knap et al., 1982; Kennedy et al., 1992). Most of the petroleum hydrocarbons are incorporated into the coral tissues, not their mucus (Knap et al., 1982). However, hydrocarbon uptake may also modify lipid ratios of coral (Burns and Knap, 1989). If lipid ratios are modified, mucus synthesis may be impacted, adversely affecting the coral's ability to protect itself from oil through mucus production (Burns and Knap, 1989).

It is unlikely that a subsurface plume from a deepwater blowout would impact shelf communities. The oil is anticipated to remain in deep water and be directed by water currents in the deep water. These currents do not typically transit from deep water up onto the shelf (Pond and Pickard, 1983; Inoue et al., 2008).

Impacts from Dispersed Oil

If dispersants are used at the sea surface, oil may mix into the water column, or if applied subsea, they can travel with currents through the water and may contact or settle on sensitive features. Note that, as indicated above, a deepwater plume would not travel onto the continental shelf, but a plume formed on the continental shelf could impact topographic features and PSBFs. If located near the source, the dispersed oil could be concentrated enough to harm the community. If the oil remains suspended for a longer period of time, it would be more dispersed and exist at lower concentrations. Reports on dispersant usage on surface oil indicate that a majority of the dispersed oil remains in the top 10 m (33 ft) of the water column, with 60 percent of the oil in the top 2 m (6 ft) (McAuliffe et al., 1981a). Dispersant usage also reduces the oil's ability to stick to particles in the water column, minimizing oil adhering to sediments and traveling to the seafloor (McAuliffe et al., 1981a). However, after the *Deepwater Horizon* oil spill, there was the formation of a dense layer of marine snow that aggregated and collected everything that it came in contact with it as it fell through the water column and settled on the seafloor (Passow et al., 2012).

Dispersed oil reaching the topographic features and PSBFs in the Gulf of Mexico would be expected to be at very low concentrations (<1 ppm) (McAuliffe et al., 1981a). Such concentrations would not be life threatening to larval or adult stages at the depth of the features based on experiments conducted with coral. Any dispersed oil in the water column that comes in contact with corals may evoke short-term negative responses by the organisms (Wyers et al., 1986; Cook and Knap, 1983; Dodge et al., 1984).

Reductions in feeding and photosynthesis could occur in coral exposed to dispersed oil. Short-term, sublethal responses of *Diploria strigosa* were reported after exposure to dispersed oil at a concentration of 20 ppm for 24 hours. Although concentrations in this experiment were higher than what is anticipated for dispersed oil at depth, effects exhibited included mesenterial filament extrusion, extreme tissue contraction, tentacle retraction, and localized tissue rupture (Wyers et al., 1986). Normal behavior resumed within 2 hours to 4 days after exposure (Wyers et al., 1986). *Diploria strigosa* exposed to dispersed oil (20:1, oil:dispersant) showed an 85 percent reduction in zooxanthellae photosynthesis after 8 hours of exposure to the mixture (Cook and Knap, 1983). However, the response was short term, as recovery occurred between 5 and 24 hours after exposure and return to clean seawater. Investigations 1 year after *Diploria strigosa* was exposed to concentrations of dispersed oil between 1 and 50 ppm for periods between 6 and 24 hours did not reveal any impacts to growth (Dodge et al., 1984).

Historical studies indicate dispersed oil to be more toxic to coral species than oil or dispersant alone. The greater toxicity may be a result of an increased number of oil droplets caused by the use of dispersant, resulting in greater contact area between oil, dispersant, and water (Elgershuizen and De Kruijf, 1976). The dispersant causes a higher water-soluble amount of oil to contact the cell membranes of the coral (Elgershuizen and De Kruijf, 1976). The mucus produced by coral, however, can protect the organism from oil. Both hard and soft corals have the ability to produce mucus, and mucus production has been shown to increase when corals are exposed to crude oil (Mitchell and Chet, 1975; Ducklow and Mitchell, 1979). Dispersed oil, however, which has very small oil droplets, does not appear to adhere to coral mucus, and larger untreated oil droplets may become trapped by the mucus barrier (Knap, 1987; Wyers et al., 1986). However, entrapment of the larger oil droplets may increase the coral's long-term exposure to oil if the mucus is not shed in a timely manner (Knap, 1987; Bak and Elgershuizen,

1976). Additionally, more recent field studies, using more realistic concentrations of dispersants did not result in the toxicity historically reported (Yender and Michel, 2010).

Although historical studies indicated dispersed oil may be more toxic than untreated oil to corals during exposure experiments, untreated oil may remain in the ecosystem for long periods of time, while dispersed oil does not (Baca et al., 2005; Ward et al., 2003). Twenty years after an experimental oil spill in Panama, oil and impacts from untreated oil were still observed at oil treatment sites, but no oil or impacts were observed at dispersed oil or reference sites (Baca et al., 2005). Long-term recovery of the coral at the dispersed oil site had already occurred as reported in a 10-year monitoring update, and the site was not significantly different from the reference site (Ward et al., 2003).

Impacts from Oil Adhering to Sediments

BOEM's policy, as described in NTL 2009-G39, prevents wells from being placed immediately adjacent to sensitive communities. In the event of a seafloor blowout, however, some oil could be carried to topographic features or PSBFs as a result of oil droplets adhering to suspended particles in the water column. Oiled sediment that settles to the seafloor may affect organisms attached to hard-bottom substrates. Impacts may include reduced recruitment success, reduced growth, and reduced coral cover as a result of impaired recruitment. Experiments have shown that the presence of oil on available substrate for larval coral settlement has inhibited larval metamorphosis and larval settlement in the area. An increase in the number of deformed polyps after metamorphosis also took place because of exposure to oil (Kushmaro et al., 1997).

The majority of organisms exposed to sedimented oil are expected to experience low-level concentrations because as the oiled sediments settle to the seafloor they are widely distributed. Coral may also be able to protect itself from low concentrations of sedimented oil that settles from the water column. Coral mucus may not only act as a barrier to protect coral from the oil in the water column, but it has also been shown to aid in the removal of oiled sediment on coral surfaces (Bak and Elgershuizen, 1976). Coral may use a combination of increased mucus production and the action of cilia to rid themselves of oiled sediment (Bak and Elgershuizen, 1976).

Impacts from Oil-Spill-Response Activity

Oil-spill-response activity may also impact sessile benthic features. Booms anchored to the seafloor are sometimes used to control the movement of oil at the water surface. Boom anchors can physically impact corals and other sessile benthic organisms, especially when booms are moved around by waves (USDOC, NOAA, 2010d). Vessel anchorage and decontamination stations set up during response efforts may also break or kill PSBFs if their location is unmapped and anchors are set on the features. Injury to coral reefs as a result of anchor impact may result in long-lasting damage or failed recovery (Rogers and Garrison, 2001). Effort should be made to keep vessel anchorage areas as far from sensitive benthic features as possible to minimize impact.

Drilling muds comprised primarily of barite may be pumped into a well to stop a blowout. If a "kill" is not successful, the mud (possibly tens of thousands of barrels) may be forced out of the well and deposited on the seafloor near the well site. Any organisms beneath the extruded drilling mud would be buried. Based on stipulations as described in NTL 2009-G39, a well should be far enough away from a topographic feature to prevent extruded drilling muds from smothering sensitive benthic communities. However, if drilling muds were to travel far enough or high enough in the water column to contact a sensitive community, the fluid would smother the existing community. Experiments indicate that corals perish faster when buried beneath drilling mud than when buried beneath carbonate sediments (Thompson, 1980). Burial may lead to the elimination of a live bottom community.

Phase 3—Onshore Contact

There would likely be no adverse impacts to topographic features and PSBFs as a result of the events and the potential impact-producing factors that could occur throughout Phase 3 of a catastrophic spill because the topographic features and PSBFs are located offshore.

Phase 4—Post-Spill, Long-Term Recovery and Response

Topographic features and PSBFs exposed to large amounts of resuspended sediments following a catastrophic, subsurface blowout could be subject to sediment suffocation, exposure to resuspended toxic contaminants, and reduced light penetration. The greatest impacts would occur to communities that exist in clear water with very low turbidity. The consequences of a blowout along, directly on, or near one of these features could be long lasting, although the occurrence of a blowout near such sensitive communities is unlikely because of stipulations described in NTL 2009-G39, which prevents drilling activity near sensitive hard bottom habitats. Impacts to a community in more turbid waters, such as the South Texas Banks, would be greatly reduced, as the species on these features are tolerant of suspended sediments, and recovery would occur quicker.

Impacts may also occur from low-level or long-term oil exposure. This type of exposure has the potential to impact reef communities, resulting in impaired health. Recovery may be fairly rapid from brief, low-level exposures, but it could be much longer with acute concentrations or long-term exposure to oil, such as in observations from Panama where untreated oil remained in the ecosystem for long periods of time, inhibiting coral recovery (Baca et al., 2005; Ward et al., 2003). Recovery time would therefore depend on recruitment from outside populations that were not affected by oiling and residence time of oil in an ecosystem.

Overall Summary and Conclusion (Phases 1-4)

A catastrophic spill on the continental shelf would have a greater impact on topographic features and PSBFs than a deepwater spill. Surface oil from a deepwater spill would be weathered and diluted by the time it reaches the surface waters over topographic features and PSBFs (if it ever reaches them), and it would be unlikely that it would mix to the depth of active growth in concentrations that could cause toxicity. Subsea plumes formed in deepwater would not travel onto the continental shelf because deep-sea currents do not travel up a slope.

A catastrophic blowout and spill on the continental shelf has a greater chance to impact topographic features and PSBFs. If the blowout occurs close enough to sensitive features, the organisms may be smothered by settling sediment that was displaced by the blowout. The farther the feature is from the blowout, the less its chance of being covered with settling sediment or sediment upon which oil adhered. In addition, distancing oil and gas activities from topographic features prevents the settlement of a sinking rig on top of a topographic feature, although it may destroy a PSBF.

In most cases, impacts from oil would be sublethal. Surface oil is not expected to mix to the zone of active growth, and any oil components that do reach that depth would be in sublethal concentrations. Subsea plumes may contact the features; however, because currents tend to travel around, instead of over, topographic features, the topographic features should be protected from subsea plumes, while lower relief PSBFs may be impacted. Overall impacts of dispersed oil would be similar to subsea plumes. Spill response activity should not impact topographic features because it is unlikely that vessels would anchor on the features, but they could anchor on unmapped, lower relief PSBFs.

Overall, a catastrophic spill would have a low probability of impacting topographic features because of the distancing requirements included in leases, as described in NTL 2009-G39, of oil and gas activities from topographic features, the depth of mixing of surface oil compared with the depth of the active growing zone, currents that sweep around the topographic features, and the weathering and dispersion of oil that would occur with distance from the source as it travels toward the features. The PSBFs could have greater impacts from a blowout as oil and gas activities are not as far distanced from them as topographic features; they have a lower relief than topographic features, which would not divert currents; and the locations of these features are not all known so accidental anchor impacts may result in breakage of the features and possibly destruction. The PSBFs would, however, have similar protection as for topographic features from surface oil.

B.3.1.8. Sargassum *Communities*

Pelagic *Sargassum* algae is a floating brown algae that occurs in all parts of the GOM throughout the year. It has a seasonal cycle so that its abundance greatly increases spring through fall, when it is carried by water currents around the south of Florida and then up the east coast (Gower and King, 2011). It occurs in patches, floating on and near the sea surface. Wind and water currents commonly drive it into

long lines or windrows; when conditions are turbulent, it becomes more scattered and mixed into the upper water column. A key to understanding impacts to *Sargassum* is that the algae is ubiquitous and occurs in scattered patches in the very top part of the water column. *Sargassum* also provides habitat for pelagic species, including fish, invertebrates, and sea turtles.

Phase 1—Initial Event

During the initial phase of a catastrophic blowout, impacts may include disturbance of sediments, destruction of the drilling rig, release of oil and natural gas (methane), and emergency response efforts. This chapter deals with the immediate effects of a blowout that would be located at least 3 nmi (3.5 mi; 5.6 km) from shore.

Since *Sargassum* is a floating pelagic (open ocean) algae, it would only be affected by impacts that occur in the top-most part of the water column. In deep water (≥ 300 m, 984 ft), sediment disturbed by the blowout would not affect *Sargassum* because the sediment would not reach the surface waters. However, in shallow water, sediment from a blowout could have minor effects on *Sargassum* algae in the immediate vicinity. The sediment would have little effect on the algae itself, producing only slight, temporary silting that could reduce photosynthesis. If the sediment is contaminated with oil, then the oil could have adverse effects on the algae. Depending on the severity of oiling, the algae could be damaged or destroyed; but this would only affect the algae in the local vicinity of the blowout. Sediment and oil would have a more acute effect on the associated invertebrate, fish, and sea turtle community that utilizes the habitat of the *Sargassum*. Impacts to these organisms may include "changes in respiration rate, abrasion and puncturing of structures, reduced feeding, reduced water filtration rates, smothering, delayed or reduced hatching of eggs, reduced larval growth or development, abnormal larval development, or reduced response to physical stimulus" (Anchor Environmental CA, L.P., 2003).

Destruction of the oil drilling rig and associated equipment could have an acute effect on patches of *Sargassum* algae that happen to be caught in the structure (if it sinks) or destroyed by fuel leaks and possible fire on the sea surface. This could destroy local patches of *Sargassum*, but it would have no measurable effect on the *Sargassum* community as a whole.

The release of oil during the initial blowout event would be expected to cover local patches of *Sargassum* algae with oil, destroying the algae and associated organisms. Methane gas may also bathe local patches of algae as it rises through the sea surface; it would have little effect on the algae itself but may poison associated organisms. The initiation of oil and gas release (as defined for this phase) at the site of the blowout event would affect only local patches of *Sargassum*, but it would have no measurable effect on the *Sargassum* community as a whole.

Emergency response activities would have minor impacts to *Sargassum* algae that comes in contact with vessels. This is mostly the simple impingement of the algae on the ships' water intake screens, including water that may be pumped in fire-fighting efforts. This minor and local effect would have no measurable effect on the *Sargassum* community as a whole.

Phase 2—Offshore Spill

During the second phase of a catastrophic blowout, the major impact of concern is the release of oil and methane over time. Response efforts may produce additional minor impacts to *Sargassum*. This chapter deals with the growing effects of a blowout that releases oil and methane into the offshore environment.

Since *Sargassum* is a floating pelagic (open ocean) algae, it would be affected by impacts that occur in the top-most part of the water column. This makes *Sargassum* habitat particularly susceptible to damage from offshore oil spills. Oceanographic processes that concentrate *Sargassum* into mats and rafts would also concentrate toxic substances. Therefore, it may be assumed that *Sargassum* would be found in areas where oil, dispersants, and other chemicals have accumulated following a catastrophic spill. Oil spreads on the sea surface to form extremely thin layers (0.01-0.1 micrometers) that cover large areas (MacDonald et al., 1996). Since *Sargassum* is ubiquitous in surface waters of the GOM, oil spreading on the sea surface can be expected to coincide with floating mats of the algae. The larger the quantity of spill and the longer it flows, the larger the area of sea surface it would cover. A catastrophic spill would cover a large area and result in impacts to a large quantity of *Sargassum* algae. For example, *Macondo* well oil spill covered up to one-third of the northern GOM (McCrea-Strub and Pauly, 2011; USDOC,

NMFS, 2011a) and may have affected about one-third of the *Sargassum* algae in the northern GOM at the time.

The severity of oiling to *Sargassum* depends largely on physical conditions. Factors include the quantity of oil at a particular launch point and its physical state, distance from the source, weather conditions, and the possible use of dispersants. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

Obviously, more oil leads to increased oiling, but the physical state of the oil changes as it weathers, biodegrades, dissipates, and emulsifies over time and distance. Storms can mix oil into the water column (expected maximum of 10-20 m [33-66 ft]; Lange, 1985; McAuliffe et al., 1975 and 1981a; Knap et al., 1985; Scarlett et al., 2005; Hemmer et al., 2010; George-Ares and Clark, 2000), possibly increasing its contact with *Sargassum* as it also mixes the *Sargassum* into the water column. However, when storms are not mixing the oil, they are also not mixing the *Sargassum*, so the *Sargassum* would float near the sea surface, just as the oil would. Convergence zones, places in the ocean where strong opposing currents meet, would collect both oil and *Sargassum*. Sea turtles, especially post-hatchlings and juveniles, use these areas for food and cover. Witherington et al. (2012) surveyed sea turtles in the eastern Gulf of Mexico and Atlantic Ocean off Florida and found that 89 percent of the turtles documented were observed within 1 m (3 ft) of floating *Sargassum*. The use of dispersants on surface oil slicks could increase the exposure of *Sargassum* to oil by promoting mixing of oil into the upper few meters of the water column. This also promotes the dispersion of oil, speeding its decline toward low concentrations that would be less toxic. Regardless, any exposure that is enough to cause visible oiling can be expected to have significant detrimental effects on the organisms associated with *Sargassum* and, likely, effects on the *Sargassum* itself. Heavy oiling of *Sargassum* near the source of the spill would destroy the affected algae. Very light exposure far from the oil source may have little effect.

The specific effects of oil on *Sargassum* depend on the severity of oiling. High to moderate levels of oiling would likely cause complete mortality. Low levels of exposure may result in a range of sublethal effects to the algae and its associated community. Powers et al. (2013) suggest that exposure to oil and/or dispersants can result in direct, sublethal, and indirect effects to *Sargassum*, resulting in death or a decrease in *Sargassum*-related ecosystem services. Sublethal responses in organisms associated with *Sargassum* may occur at concentrations as low as 1-10 ppb (Hyland and Schneider, 1976). Rogers (1990) documented impacts such as reduced growth, alteration in form, and reduced recruitment and productivity. Other sublethal impacts may include reduced feeding rates, reduced ability to detect food, erratic movement, ciliary inhibition, tentacle retraction, reduced movement, decreased aggression, and altered respiration (Scarlett et al., 2005; Suchanek, 1993). Embryonic life stages of organisms may experience toxicity at lower levels than the adult stages (Fucik et al., 1995; Suchanek, 1993; Beiras and Saco-Álvarez, 2006; Byrne, 1989). The algae itself would be less sensitive than many of its associates, since the algae produces oils of its own and has a waxy coating that may protect it from physical oiling.

Response efforts aimed at removing oil from the affected area would have minor impacts on *Sargassum* algae as well. Response vessels would impinge a small amount of the algae on their propellers and cooling-water intakes. Cleanup processes such as booming, skimming, and in-situ burning would also trap and destroy patches of *Sargassum*; however, these activities would take place in areas of high concentration of surface oil, where *Sargassum* would likely be destroyed by oil contamination even if the cleanup activity were absent.

Phase 3—Onshore Contact

This third phase of a catastrophic blowout focuses on the approach of oil to the shoreline. This involves the possible oiling of coastal resources including beaches, wetlands, SAV and seagrasses, the shallow seafloor, and any resources drifting in the water column (e.g., *Sargassum*). Response efforts can produce additional serious impacts.

There would likely be little additional impact to pelagic *Sargassum* algae as oil approaches a shoreline. Since both the algae and surface oil approaching shore would be guided by the same forces (wind and water currents), they would likely be already traveling together, with the algae already contaminated. Once it is onshore, the *Sargassum* would die, regardless of oil contamination. *Sargassum* that washes ashore has some value to the ecosystem as it provides food and shelter for some organisms as it decays. This value would be mostly lost if the *Sargassum* is oiled when it reaches shore.

Phase 4—Post-Spill, Long-Term Recovery and Response

The final phase of a catastrophic blowout is the long-term response of the ecosystem and its recovery. Both, the natural rate of recovery and the persistence of oil in natural habitats over time determine the long-term effects. Contaminants biodegrade over time, but they may become sequestered as inert forms (e.g., buried in sediment) until disturbed (by storms) and re-activated, producing renewed impacts.

Sargassum algae has a yearly seasonal cycle of growth and a yearly cycle of migration from the GOM to the western Atlantic. A catastrophic spill could affect a large portion of the annual crop of the algae. A large event, such as the *Macondo* well blowout and spill, could reduce the standing crop of *Sargassum* in the GOM and subsequently in the western Atlantic if it coincided with a period when *Sargassum* distribution was limited to the northwest GOM in an area known to be a nursery area. This could have a cascading effect down current (in the Atlantic) that would stress the cycles of other organisms that depend on the *Sargassum* habitat. However, the effect can be expected to diminish with remoteness from the direct impacts of the spill, i.e., the algae community itself would be most affected, with lesser effects on organisms that utilize the habitat as a nursery, for feeding, as shelter, or other purposes.

While a large spill event could affect a large portion of the standing crop of *Sargassum*, several factors contribute to the quick recovery of the habitat. *Sargassum* algae is predominately found in the open-ocean pelagic habitat. Once the spill event subsides, the pelagic habitat would quickly regain its typically very high water quality. The pelagic habitat far from shore is also far from land-based sources of pollution. Only part of the *Sargassum* stocks would be affected; algae not affected by the spill event would continue to grow normally and repopulate the habitat. Since *Sargassum* has a seasonal cycle of growth in the summer and reduction in the winter, populations in the winter following a catastrophic event may be similar to populations of any other year. Relatively small populations survive each winter, subsequently repopulating the habitat each year. With this pattern, recovery from the effects of a catastrophic event is expected within 1-2 growing seasons.

Overall Summary and Conclusion (Phases 1-4)

Pelagic *Sargassum* algae is one of the most likely habitats to be affected by a catastrophic offshore oil spill; however, because of its ubiquitous distribution and seasonal cycle, recovery is expected within 1-2 years. *Sargassum* algae floats on and near the sea surface and occurs in patches that can be collated into windrows by wind and water currents. Oil from a spill offshore would accumulate in the same waters, making it inevitable that some patches of *Sargassum* would be severely affected.

The initial catastrophic event (Phase 1) could destroy *Sargassum* patches in the immediate vicinity of the accident. Impingement, fire, and the initial concentrated spillage of oil and fuels would destroy local patches. Sediments disturbed by the accident would only affect *Sargassum* if the event occurred in shallow waters.

The duration of the spill event (Phase 2) would have the most effect on floating *Sargassum* algae. Patches of algae within the entire coverage of the oil slick would be subject to severe damage and death. Algae in areas farther from the spill, receiving lower level impacts, may still suffer damage, especially the sensitive invertebrate and fish communities associated with the habitat. Efforts to remove the oil could gather *Sargassum* with the oil, but these algae patches would likely be destroyed by the oil anyway since the collection activities would occur in areas of concentrated oil.

As oil approaches shore (Phase 3), impacts to floating *Sargassum* algae would not increase much, as the algae would likely already be exposed to the oil since wind and water currents drive both the algae and the oil.

The recovery of floating *Sargassum* algae (Phase 4) may occur within 1-2 years because the algae has a yearly cycle of subsidence and re-growth. As long as the nursery grounds are not completely saturated with oil, the pelagic habitat would quickly regain its high level of water quality after the cessation of a spill. Not all of the *Sargassum* habitat would be affected, even by a catastrophic spill; healthy algae would continue to grow and replenish the population. Within 1-2 years, the *Sargassum* algae community may have completely recovered from the impacts of a catastrophic spill.

B.3.1.9. Chemosynthetic Deepwater Benthic Communities

Deepwater benthic communities of the Gulf of Mexico include chemosynthetic communities and nonchemosynthetic communities (also termed “deepwater coral communities” [refer to **Chapter**

B.3.1.10]) that are dependent on the presence of hard substrates. Certain deepwater coral species, such as *Lophelia pertusa*, attach to exposed hard substrates and can create complex three-dimensional structural microhabitats, sometimes termed "framework forming" corals. These structures are often used by benthic invertebrates, including echinoderms (e.g., brittle stars and basket stars), sea anemones, crustaceans, and various other benthic megafauna. Other species of soft corals and gorgonians (commonly known as sea whips and sea fans) may also provide a lesser degree of usable habitat for other benthic megafauna. Deep water is defined here as water depths >300 m (984 ft). These types of deepwater coral communities are relatively rare in shallower waters. The possible impacts to deepwater coral communities from a catastrophic blowout depend on the location and the nature of the event.

Phase 1—Initial Event

During the initial phase of a catastrophic blowout, impacts may include the disturbance of sediments, destruction of the drilling rig, release of oil and natural gas (methane), and emergency response efforts. This chapter deals with the immediate effects of a blowout located at least 3 nmi (3.5 mi; 5.6 km) from shore.

A catastrophic blowout outside the well casing and below the seafloor or at the seafloor-water interface could resuspend large quantities of bottom sediments and create a large crater, destroying many organisms within a few hundred meters of the wellhead. Some fine sediment could travel up to a few thousand meters before redeposition, negatively impacting a localized area of benthic communities. If a blowout were to occur close enough to a chemosynthetic community, suspended sediment may impact the organisms. Restrictions described in NTL 2009-G40 require drilling to be sufficiently distanced from possible chemosynthetic communities. During a blowout, sediment may become contaminated with oil and subsequently deposit that oil down-current from the source. The highest concentrations of contamination would be nearest the well, and concentrations would diminish with distance. A catastrophic blowout that occurs above the seabed (at the rig, along the riser between the seafloor and sea surface, or through leak paths on the BOP/wellhead) would not disturb the sediment.

Destruction of the oil drilling rig and associated equipment could have an acute effect on any chemosynthetic communities caught under the direct impact of the equipment when it falls to the seafloor. However, the distancing requirements described in NTL 2009-G40 reduce the probability that a rig would settle directly on sensitive habitat.

A catastrophic blowout would likely result in released oil rapidly rising to the sea surface because typical reserves in the GOM have specific gravity characteristics that are much lighter than water (refer to **Chapter 3.2.1.3** of this Supplemental EIS; Environment Canada, 2011; Trudel et al., 2001). The oil would surface almost directly over the source location. Oil floating to the sea surface would be effectively removed from affecting chemosynthetic communities on the seafloor. Even oil treated with chemical dispersants on the sea surface would not be expected to have widespread impacts to deepwater communities. Reports on dispersant usage on surface oil indicate that a majority of the dispersed oil remains in the top 10 m (33 ft) of the water column, with 60 percent of the oil in the top 2 m (6 ft) (McAuliffe et al., 1981a; Lewis and Aurand, 1997). Lubchenco et al. (2010) reports that chemically dispersed surface oil from the *Macondo* well blowout and oil spill remained in the top 6 m (20 ft) of the water column where it mixed with surrounding waters and biodegraded. However, if the oil is ejected under high pressure, micro-droplets of oil may form and become entrained in the water column (Boehm and Fiest, 1982; Adcroft et al., 2010). Upward movement of oil may also be reduced if methane mixed with the oil is dissolved into the water column, reducing the buoyancy of the oil/gas stream (Adcroft et al., 2010). Large oil droplets would rise to the sea surface, but smaller droplets, formed by vigorous turbulence in the plume or the injection of dispersants, may remain neutrally buoyant in the water column, creating a subsurface plume (Adcroft et al., 2010; Joint Analysis Group, 2010a). The likelihood that a chemosynthetic community would be affected by the initial stage of a catastrophic event would be reduced with adherence to the NTL 2009-G40 requirements distancing drilling activities from sensitive habitats because released oil would rise rapidly to a level above the habitat and because surface oil would not mix to the depths of the chemosynthetic communities. The required separation distance would also allow for a subsea plume to mix with the surrounding water and become diluted before it reached a deepwater community.

Phase 2—Offshore Spill

During the second phase of a catastrophic blowout, the major impact of concern is the release of oil and methane over time. Response efforts may produce additional impacts. This chapter deals with the growing effects of a blowout that releases oil and methane into the offshore environment.

Oil and chemical spills that originate at the sea surface are not considered to be a potential source of measurable impacts on chemosynthetic communities because of the water depths at which these communities are located. Oil spills at the surface would tend not to sink, and the risk of weathered components of a surface slick reaching the benthos in any measurable concentration would be very small. Large concentrations of surface oil are unlikely to physically mix to the depths of deepwater communities under natural conditions (Lange, 1985; McAuliffe et al., 1975 and 1981a; Tkalich and Chan, 2002).

A catastrophic spill resulting from a loss of well control in deep water has the potential to impact offshore benthic communities, particularly if the use of chemical dispersants increases exposure time by creating subsurface plumes. Sublethal effects are possible for communities that receive a lower level of impact. Examples of these effects could include temporary reductions in feeding, expenditure of energy to remove the oil, loss of gametes and reproductive delays, and loss of tissue mass.

Oil plumes that remain in the water column for longer periods would disperse and decay, having only a minimal effect. Depending on how long it remains in the water column, oil may be thoroughly degraded by biological action before contacting the seafloor. Water currents can carry a plume to contact the seafloor directly but a more likely scenario would be for oil to adhere to other particles and precipitate to the seafloor, much like rainfall, and which is sometimes called "marine snow" (Kingston et al., 1995; International Tanker Owners Pollution Federation Limited, 2011; Passow et al., 2012). Oil would also reach the seafloor through planktonic consumption and associated excretion, which is distributed over the seafloor (International Tanker Owners Pollution Federation Limited, 2011). These mechanisms would result in a wide distribution of small amounts of oil (or oil by-products). This oil would be in the process of biodegradation from bacterial action, which would continue on the seafloor, resulting in scattered microhabitats with an enriched carbon environment (Hazen et al., 2010). Habitats directly under the path of the oil plume as it disperses and "rains" down to the seafloor may experience minor effects; however, since the oil would be deposited in a widely scattered and decayed state, little overall effect is anticipated.

For example, White et al. (2012) documented a deepwater coral site at a depth of 1,370 m (4,495 ft) that was severely damaged following the *Deepwater Horizon* explosion, oil spill, and response. The site is in Mississippi Canyon Block 294, 11 km (7 mi) southwest of the spill location. Flocculent material was observed covering these corals, and biomarker signatures from residual hydrocarbon compounds matched that of *Deepwater Horizon* oil. Associated invertebrates also exhibited signs of stress. Fisher et al. (2014) described two additional deepwater coral communities with negative impacts attributed to the *Deepwater Horizon* oil spill: Mississippi Canyon Block 297 (6 km [4 mi] south of the *Macondo* wellhead) and Mississippi Canyon Block 344 (22 km [14 mi] southeast of the *Macondo* wellhead). Observed impacts at Mississippi Canyon Block 297 were roughly similar to those seen in Mississippi Canyon Block 294 (White et al., 2012), but the impacts at Mississippi Canyon Block 344 were less severe. Numerous other deepwater coral communities investigated since the spill have remained healthy (White et al., 2012; Fisher et al., 2014). Although damage to chemosynthetic communities in the vicinity of the *Macondo* well has not been reported to date, despite numerous research efforts in that vicinity (Shedd, official communication, 2015), the above studies illustrate the potential for damage via "marine snow."

Although (as shown in the *Deepwater Horizon* oil spill) subsurface plumes can be generated when oil is ejected under high pressure or dispersants are used subsea, in most cases, a majority of the oil originating from a seafloor blowout in deep water is expected to rise rapidly to the sea surface. Upward movement of the oil may also be reduced if methane mixed with the oil is dissolved into the water (Adcroft et al., 2010). A sustained spill would continuously create surface slicks and possibly subsurface spill plumes. Some of the oil in the water column would become diluted over time, reducing transport to the seafloor (Vandermeulen, 1982). Concentrations of dispersed and dissolved oil in the *Macondo* well blowout and spill subsea plume were reported to be in the part per million range or less and were generally lower away from the water's surface and away from the wellhead (Adcroft et al., 2010; Haddad and Murawski, 2010; Joint Analysis Group, 2010; Lubchenco et al., 2010). In addition, microbial degradation of oil occurs in the water column rendering oil less toxic when it contacts the seafloor (Hazen et al., 2010).

A sustained spill may result in elevated exposure concentrations to chemosynthetic features if a subsea oil plume contacts them directly. Dispersed oil is mixed with water, and its movement is then dictated by water currents and the physical, chemical, and biodegradation pathways. BOEM's policy (refer to NTL 2009-G39) prevents wells from being placed immediately adjacent to sensitive communities; however, in the event of a seafloor blowout, some oil could be carried to chemosynthetic communities by subsea plumes. Impacts may include reduced recruitment success, reduced growth, and reduced biological cover as a result of impaired recruitment. Concentrated oil plumes reaching chemosynthetic communities could cause oiling of organisms, resulting in the death of entire populations on localized sensitive habitats. The longer the oil remains suspended in the water column, the more dispersed, less concentrated, and more biodegraded it would become. Depending on how long oil remained suspended in the water column, it may be thoroughly degraded by biological action before contacting the seafloor (Hazen et al., 2010; Valentine et al., 2010). Biodegradation rates in cold, deepwater environments are not well understood at this time. In general, potential impacts to chemosynthetic communities would be localized due to the directional movement of oil plumes by the water currents and because the sensitive habitats have a scattered, patchy distribution. While a few patch habitats may be affected, the Gulfwide ecosystem of chemosynthetic communities would be expected to suffer no significant effects.

Drilling muds comprised primarily of barite may be pumped into a well to stop a blowout. If a "kill" is not successful, the mud (possibly tens of thousands of barrels) may be forced out of the well and deposited on the seafloor near the well site. Any organisms beneath the extruded drilling mud would be buried. Based on stipulations as described in NTL 2009-G40, a well should be far enough away from a chemosynthetic community to prevent extruded drilling muds from smothering sensitive benthic communities.

Phase 3—Onshore Contact

The third phase of a catastrophic blowout focuses on the approach of oil to the shoreline. This involves the possible oiling of coastal resources including beaches, wetlands, SAV and seagrasses, the shallow seafloor, and any resources drifting in the water column. Response efforts can produce additional serious impacts. There would be no additional adverse impacts to chemosynthetic communities in deep water as a result of the events and the potential impact-producing factors that could occur throughout Phase 3 of a catastrophic spill because the chemosynthetic communities are located offshore in deep water (>300 m, 610 ft).

Phase 4— Post-Spill, Long-Term Recovery and Response

The final phase of a catastrophic blowout is the long-term response of the ecosystem and its recovery. Both the natural rate of recovery and the persistence of oil in natural habitats over time determine what long-term effects may occur. Contaminants degrade over time but may become sequestered as inert forms (e.g., buried in sediment) until disturbed and reactivated, producing renewed impacts. Valentine et al. (2014) found evidence of an area of approximately 3,200 km² (1,236 mi^2) around the *Macondo* well contaminated by ~1,800 kg (±1,000 kg) (~3,968 lb [±2,205 lb]) of excess hopane (a tracer for crude oil) and reflecting deposition of oil from the *Deepwater Horizon* explosion and oil spill. Maps of the contaminated area in Valentine et al. (2014) were compared with BOEM's seismic water-bottom anomaly database, and it appears that some chemosynthetic communities may be within the contamination footprint, although damage to chemosynthetic communities in the vicinity of the *Macondo* well has not been reported to date despite numerous research efforts in that vicinity (Shedd, official communication, 2015).

Because research specific to chemosynthetic organisms is limited, it can be useful to consider research regarding impacts relevant to deepwater corals, especially those associated with seeps that can be included in the broader definition of a chemosynthetic community, such as *Callogorgia delta*. Such research (DeLeo et al., 2015) is considered here as potentially relevant, with the major caveat that experiments were not performed on chemosynthetic organisms themselves and that results could be different. DeLeo et al. (2015) performed laboratory tests on the effects of (1) bulk oil-water mixtures, (2) water-accommodated oil fractions, (3) the chemical dispersant COREXIT 9500As, and (4) a combination of hydrocarbons and dispersants on representative, living samples of three species of

northern GOM corals (i.e., *Paramuricea* type B3, *Callogorgia delta*, and *Leiopathes glaberrima*) obtained in the field at depths of 500-1,100 m (1,640-3,609 ft), exposing the samples for a 96-hour period. All species showed greater health declines in response to dispersant alone (2.3-3.4 fold) and to the oil-dispersant mixtures (1.1-4.4 fold) than in the oil only treatments, which did not result in mortality. *C. delta*, which is found in increased abundance near natural hydrocarbon seeps and may have some natural adaptation to short-term oil exposure, showed less severe health declines than the other two species in response to oil and oil/dispersant mixtures. It can be reasonably concluded that chemosynthetic organisms such as tubeworms and bivalves, which intentionally consume hydrocarbons, would possess similar adaptations to naturally occurring levels of oil.

One recent in-situ study (White et al., 2014) following the *Deepwater Horizon* explosion, oil spill, and response evaluated possible long-term persistence of both oil and a component of the dispersant COREXIT used during that spill, i.e., the anionic surfactant DOSS (dioctyl sodium sulfosuccinate). Samples were taken from both seafloor sediments and flocculent material in an affected deepwater coral community in Mississippi Canyon Block 294 and compared with other *Deepwater Horizon* oil spill-derived samples collected on coastal beaches. While this study did not measure or link toxicity of oil or DOSS to coral tissues, it noted that DOSS was found to persist for 6 months in the samples taken from the coral community and up to 4 years in the beach samples. These findings could present an additional concern if sediments containing DOSS are demonstrated to be toxic to deepwater benthic organisms. Another study of this same area (Hsing et al., 2013), however, indicated that some of the corals with the least damage appear to be improving in health.

If oil is ejected under high pressure or dispersants are applied at the source near the seafloor, oil would mix into the water column, be carried by underwater currents, and eventually contact the seafloor in some form, either concentrated (near the source) or dispersed and decayed (farther from the source). The oil could then impact patches of chemosynthetic community habitat in its path. The farther the dispersed oil travels, the more diluted it would become as it mixes with surrounding water. Chemosynthetic communities located at more than 610 m (2,000 ft) away from a blowout could experience minor impacts from suspended sediments that travel with currents, although the sediment concentration would be diluted with distance from the well. Studies indicate that periods of decades to hundreds of years are required to reestablish a seep community once it has disappeared (depending on the community type) (Powell, 1995; Fisher, 1995). There is evidence that substantial impacts on these communities could permanently prevent reestablishment, particularly if hard substrate required for recolonization is buried by resuspended sediments from a blowout.

Overall Summary and Conclusion (Phases 1-4)

Chemosynthetic communities would potentially be subject to detrimental effects from a catastrophic seafloor blowout. Sediment and oiled sediment from the initial event (Phase 1) could have lethal or sublethal impacts if in close proximity, but they are not likely to reach chemosynthetic communities in heavy amounts because of requirements described in NTL 2009-G40. Fine sediment from a blowout may reach the location of sensitive habitats, producing sublethal effects. The initial accident could result in the drilling rig and equipment falling on a sensitive seafloor habitat if the structure travels more than 610 m (2,000 ft) from the well site.

The ongoing spill event (Phase 2) would have the most effect on chemosynthetic communities. Chemosynthetic communities are at risk from subsea oil plumes that could directly contact localized patches of sensitive habitat. Oil plumes reaching chemosynthetic communities could cause oiling of organisms, resulting in the death of entire populations on localized sensitive habitats. However, potential impacts would be localized due to the directional movement of oil plumes by the water currents and because the sensitive habitats have a scattered, patchy distribution. The more likely scenario would be exposure to widely dispersed, biodegraded particles that “rain” down from a passing oil plume. While a few patch habitats may be affected, the Gulfwide ecosystem of chemosynthetic communities would be expected to suffer no significant effects.

Oil reaching the shore (Phase 3) presents no additional adverse impacts to chemosynthetic communities because the chemosynthetic communities are located offshore in deep water (>300 m; 610 ft).

The recovery of chemosynthetic communities (Phase 4) depends on the severity of initial impacts. A catastrophic spill combined with the application of dispersant has the potential to cause devastating

effects on local patches of habitat in the path of subsea plumes where they physically contact the seafloor. Studies indicate that periods from decades to hundreds of years are required to reestablish a seep community once it has disappeared (depending on the community type) (Powell, 1995; Fisher, 1995). The burial of hard substrate could permanently prevent recovery. Sublethal effects are possible for communities that receive a lower level of impact. Examples of these effects could include temporary reduction in feeding, expenditure of energy to remove the oil, loss of gametes and reproductive delays, and loss of tissue mass. However, most chemosynthetic community habitats are expected to experience no impacts from a catastrophic seafloor blowout because of the directional movement of oil plumes by the water currents and because chemosynthetic communities have a scattered, patchy distribution.

B.3.1.10. Nonchemosynthetic Deepwater Benthic Communities

Deepwater benthic communities of the Gulf of Mexico include chemosynthetic communities (refer to **Chapter B.3.1.9**) and nonchemosynthetic deepwater benthic communities (also termed "deepwater coral communities") that are dependent on the presence of hard substrates. Certain deepwater coral species, such as *Lophelia pertusa*, attach to exposed hard substrates and can create complex three-dimensional structural microhabitats, sometimes termed "framework forming" corals. These structures are often used by benthic invertebrates, including echinoderms (e.g., brittle stars and basket stars), sea anemones, crustaceans, and various other benthic megafauna. Other species of soft corals and gorgonians (commonly known as sea whips and sea fans) may also provide a lesser degree of usable habitat for other benthic megafauna. Deep water is defined here as water depths >300 m (984 ft). These types of deepwater coral communities are relatively rare in shallower waters. The possible impacts to deepwater coral communities from a catastrophic blowout depend on the location and the nature of the event.

Phase 1—Initial Event

During the initial phase of a catastrophic blowout, impacts may include disturbance of sediments, destruction of the drilling rig, release of oil and natural gas (methane), and emergency response efforts. This phase deals with the immediate effects of a blowout located at least 3 nmi (3.5 mi; 5.6 km) from shore.

A catastrophic blowout outside the well casing and below the seafloor or at the seafloor-water interface could resuspend large quantities of bottom sediments and create a large crater, destroying many organisms within a few hundred meters of the wellhead. A blowout that occurs outside the well casing can rapidly deposit 30 cm (12 in) or more of sediment within a few hundred meters and may smother much of the benthic community in a localized area. Some fine sediment could travel up to a few thousand meters before redeposition, negatively impacting a localized area of benthic communities. If a blowout were to occur close enough to a sensitive deepwater coral community, suspended sediment may impact a localized area of benthic organisms. Allers et al. (2013) demonstrated initial resilience of the structure-forming deepwater coral *Lophelia pertusa* to sedimentation but noted lethal or sublethal impacts from complete burial or partial sedimentation that continued for an extended period of time. Restrictions described in NTL 2009-G40 require drilling to be distanced at least 610 m (2,000 ft) from possible deepwater coral communities. During a blowout, suspended sediment may become contaminated with oil and subsequently deposit that oil down-current from the source. The highest concentrations of contamination would be nearest the well, and concentrations would diminish with distance. A catastrophic blowout that occurs above the seabed (at the rig, along the riser between the seafloor and sea surface, or through leak paths on the BOP/wellhead) would not disturb the sediment.

Destruction of the oil drilling rig and associated equipment could have an acute effect on any nonchemosynthetic communities caught under the direct impact of the equipment when it falls to the seafloor. However, the restrictions described in NTL 2009-G40 require drilling locations to be 610 m (2,000 ft) from any possible indications of sensitive deepwater benthic communities, reducing the probability that a rig would settle directly on sensitive habitat.

A catastrophic blowout would likely result in released oil rapidly rising to the sea surface because typical reserves in the GOM have specific gravity characteristics that are much lighter than water (refer to **Chapter 3.2.1.3** of this Supplemental EIS; Environment Canada, 2011; Trudel et al., 2001). The oil would surface almost directly over the source location. Oil floating to the sea surface would be effectively removed from affecting nonchemosynthetic communities on the seafloor. Even oil treated

with chemical dispersants on the sea surface would not be expected to have widespread impacts to deepwater communities. Reports on dispersant usage on surface oil indicate that a majority of the dispersed oil remains in the top 10 m (33 ft) of the water column, with 60 percent of the oil in the top 2 m (6 ft) (McAuliffe et al., 1981a; Lewis and Aurand, 1997). Lubchenco et al. (2010) report that chemically dispersed surface oil from the *Macondo* well blowout and oil spill remained in the top 6 m (20 ft) of the water column where it mixed with surrounding waters and biodegraded. However, if the oil is ejected under high pressure, micro-droplets of oil may form and become entrained in the water column (Boehm and Fiest, 1982; Adcroft et al., 2010). Upward movement of the oil may also be reduced if methane mixed with the oil is dissolved into the water column, reducing the buoyancy of the oil/gas stream (Adcroft et al., 2010). Large oil droplets would rise to the sea surface, but smaller droplets, formed by vigorous turbulence in the plume or the injection of dispersants, may remain neutrally buoyant in the water column, creating a subsurface plume (Adcroft et al., 2010; Joint Analysis Group, 2010). The likelihood that a deepwater coral community would be affected by the initial stage of a catastrophic event would be reduced with adherence to the NTL 2009-G40 requirements distancing drilling activities from sensitive habitats because released oil would rapidly rise to a level above the habitat and because surface oil would not mix to the depths of such communities. The required separation distance would also allow for a subsea plume to mix with the surrounding water and become diluted before it reached a deepwater community.

Phase 2—Offshore Spill

During the second phase of a catastrophic blowout, the major impact of concern is the release of oil and methane over time. Response efforts may produce additional impacts. This chapter deals with the growing effects of a blowout that releases oil and methane into the offshore environment.

Oil and chemical spills that originate at the sea surface are not considered to be a potential source of measurable impacts on deepwater coral communities because of the water depths at which these communities are located. Oil spills at the surface would tend not to sink, and the risk of weathered components of a surface slick reaching the benthos in any measurable concentration would be very small. Large concentrations of surface oil are unlikely to physically mix to the depths of deepwater communities under natural conditions (Lange, 1985; McAuliffe et al., 1975 and 1981a; Tkalich and Chan, 2002).

A catastrophic spill resulting from a loss of well control in deep water has the potential to impact offshore benthic communities, particularly if the use of chemical dispersants increases exposure time by creating subsurface plumes. Sublethal effects are possible for communities that receive a lower level of impact. Examples of these effects could include temporary lack of feeding, expenditure of energy to remove the oil, loss of gametes and reproductive delays, and loss of tissue mass. Oil plumes that remain in the water column for longer periods would disperse and decay, having only a minimal effect. Depending on how long it remains in the water column, oil may be thoroughly degraded by biological action before contacting the seafloor. Water currents can carry a plume to contact the seafloor directly, but a more likely scenario would be for oil to adhere to other particles and precipitate to the seafloor, much like rainfall (Kingston et al., 1995; International Tanker Owners Pollution Federation Limited, 2011; Passow et al., 2012). Oil also would reach the seafloor through consumption by plankton, with excretion distributed over the seafloor (International Tanker Owners Pollution Federation Limited, 2011). These mechanisms would result in a wide distribution of small amounts of oil (or oil by-products). This oil would be in the process of biodegradation from bacterial action, which would continue on the seafloor, resulting in scattered microhabitats with an enriched carbon environment (Hazen et al., 2010). Habitats directly under the path of the oil plume as it disperses and "rains" down to the seafloor may experience minor effects; however, because the oil would be deposited in a widely scattered and decayed state, little effect is anticipated.

For example, White et al. (2012) documented a deepwater coral site at a depth of 1,370 m (4,495 ft) that was severely damaged following the *Deepwater Horizon* explosion, oil spill, and response. The site is in Mississippi Canyon Block 294, 11 km (7 mi) southwest of the spill location. Flocculent material was observed covering these corals, and biomarker signatures from residual hydrocarbon compounds matched that of *Deepwater Horizon* oil. Associated invertebrates also exhibited signs of stress. Fisher et al. (2014) described two additional deepwater coral communities with negative impacts attributed to the *Deepwater Horizon* oil spill: Mississippi Canyon Block 297 (6 km [4 mi] south of the *Macondo* wellhead) and Mississippi Canyon Block 344 (22 km [14 mi] southeast of the *Macondo* wellhead).

Observed impacts at Mississippi Canyon Block 297 were roughly similar to those seen in Mississippi Canyon Block 294 (White et al., 2012), but the impacts at Mississippi Canyon Block 344 were less severe. Numerous other deepwater coral communities investigated since the spill have remained healthy (White et al., 2012; Fisher et al. 2014).

Although (as shown in the *Deepwater Horizon* oil spill) subsurface plumes can be generated when oil is ejected under high pressure or when dispersants are used subsea in most cases, a majority of the oil originating from a seafloor blowout in deep water is expected to rise rapidly to the sea surface. Upward movement of the oil may also be reduced if methane mixed with the oil is dissolved into the water (Adcroft et al., 2010). A sustained spill would continuously create surface slicks and possibly subsurface spill plumes. Some of the oil in the water column would become diluted over time, reducing transport to the seafloor (Vandermeulen, 1982). Concentrations of dispersed and dissolved oil in the *Deepwater Horizon* oil spill's subsea plume were reported to be in the part per million range or less and were generally lower away from the water's surface and away from the wellhead (Adcroft et al., 2010; Haddad and Murawski, 2010; Joint Analysis Group, 2010; Lubchenco et al., 2010). In addition, microbial degradation of the oil occurs in the water, rendering the oil less toxic when it contacts the seafloor (Hazen et al., 2010). However, as evidenced by the report of White et al. (2012), subsea plumes can still retain toxic concentrations over a distance of at least 11 km (7 mi).

Oil in a plume can adhere to other particles and precipitate to the seafloor, much like rainfall (Kingston et al., 1995; International Tanker Owners Pollution Federation Limited, 2011; Passow et al., 2012). Oil also would reach the seafloor through consumption by plankton, with excretion distributed over the seafloor (International Tanker Owners Pollution Federation Limited, 2011). These mechanisms would result in a wide distribution of small amounts of oil. Throughout these processes, oil would be biodegraded from bacterial action, which would continue on the seafloor, resulting in scattered microhabitats with an enriched carbon environment (Hazen et al., 2010).

A sustained spill may result in elevated exposure concentrations to deepwater coral communities if a subsea oil plume contacts them directly. Dispersed oil is mixed with water, and its movement is then dictated by water currents and the physical, chemical, and biological degradation pathways. BOEM's policy (refer to NTL 2009-G40) prevents wells from being placed immediately adjacent to sensitive communities; however, in the event of a seafloor blowout, some oil could be carried to deepwater coral communities by subsea plumes. Impacts may include reduced recruitment success, reduced growth, and reduced biological cover as a result of impaired recruitment. Concentrated oil plumes reaching deepwater coral communities could cause oiling of organisms, resulting in the death of entire populations on localized sensitive habitats. The longer the oil remains suspended in the water column the more dispersed, less concentrated, and more degraded it would become. Depending on how long oil remained suspended in the water column, it may be thoroughly degraded by biological action before contacting the seafloor (Hazen et al., 2010; Valentine et al., 2010). Biodegradation rates in cold, deepwater environments are not well understood at this time. In general, the potential impacts to deepwater deepwater coral communities would be localized due to the directional movement of oil plumes by the water currents and because the sensitive habitats have a scattered, patchy distribution. While a few patch habitats may be affected, the Gulfwide ecosystem of deepwater coral communities would be expected to suffer no significant effects.

Drilling muds comprised primarily of barite may be pumped into a well to stop a blowout. If a "kill" is not successful, the mud (possibly tens of thousands of barrels) may be forced out of the well and deposited on the seafloor near the well site. Any organisms beneath the extruded drilling mud would be buried. Based on stipulations as described in NTL 2009-G40, a well should be sufficiently distanced from sensitive deepwater coral communities to prevent extruded drilling muds from smothering them.

Phase 3—Onshore Contact

The third phase of a catastrophic blowout focuses on the approach of oil to the shoreline. This involves the possible oiling of coastal resources including beaches, wetlands, SAV and seagrasses, the shallow seafloor, and any resources drifting in the water column. Response efforts can produce additional serious impacts. There would be no adverse impacts to deepwater coral communities in deep water as a result of the events and the potential impact-producing factors that could occur throughout Phase 3 of a catastrophic spill because the communities are located offshore in deep water (>300 m; 610 ft).

Phase 4—Post-Spill, Long-Term Recovery and Response

The final phase of a catastrophic blowout is the long-term response of the ecosystem and its recovery. Both the natural rate of recovery and the persistence of oil in natural habitats over time determine what long-term effects may occur. Contaminants degrade over time, but they may become sequestered as inert forms (e.g., buried in sediment) until disturbed and re-activated, potentially producing renewed impacts. Valentine et al. (2014) found evidence of an area of approximately 3,200 km² (1,236 mi^2) around the *Macondo* well contaminated by ~1,800 kg (±1,000 kg) (~3,968 lb [±2,205 lb]) of excess hopane (a tracer for crude oil), reflecting deposition of oil from the *Deepwater Horizon* explosion and oil spill.

Although deepwater coral communities often live in close association with hydrocarbon seeps (since the carbonate substrate is precipitated by chemosynthetic communities), this does not mean they are necessarily tolerant to the effects of oil contamination. Natural seepage is very constant and at very low rates as compared with the potential volume of oil released from a catastrophic event (blowout or pipeline rupture). In addition, deepwater coral organisms, such as *Lophelia pertusa*, inhabit areas around the perimeter of seeps and sites where hydrocarbon seepage has reduced its flow or stopped. Typical Gulf of Mexico oil is light and floats rapidly to the surface rather than being carried horizontally across benthic communities by water currents (Johansen et al., 2001; MacDonald et al., 1995; Trudel et al., 2001). So, although deepwater coral communities are often found near naturally occurring oil seeps, they are not typically exposed to concentrated oil.

If oil is ejected under high pressure or dispersants are applied at the source near the seafloor, oil would mix into the water column, be carried by underwater currents, and eventually contact the seafloor in some form, either concentrated (near the source) or dispersed and decayed (farther from the source). The oil could then impact patches of deepwater coral community habitat in its path. The farther the dispersed oil travels, the more diluted it would become as it mixes with surrounding water. Sensitive deepwater coral communities distanced >610 m (2,000 ft) away from a blowout could experience minor impacts from suspended sediments that travel with currents, although the sediment concentration would become more diluted with distance.

Laboratory tests by DeLeo et al. (2015) on the relative effects of oil, chemical dispersants, and chemically dispersed oil mixtures on three species of northern GOM corals (i.e., *Paramuricea* type B3, *Callogorgia delta*, and *Leiopathes glaberrima)* found much greater health declines in response to chemical dispersants and to oil-dispersant mixtures than to oil-only treatments, which did not result in mortality. The coral species *Callogorgia delta*, which is found in increased abundance near natural hydrocarbon seeps and may have some natural adaptation to short-term oil exposure, showed less severe health declines than the other two species in response to oil and oil/dispersant mixtures. It must always be noted that, generally, laboratory experimental concentrations are designed to discover toxicity thresholds (DeLeo et al., 2015) that exceed likely exposure concentrations in the field. These results may not be applicable to all deepwater coral species.

One recent in-situ study (White et al., 2014) following the *Deepwater Horizon* explosion, oil spill, and response evaluated possible long-term persistence of both oil and a component of the COREXIT dispersant used during that spill, i.e., the anionic surfactant DOSS (dioctyl sodium sulfosuccinate). Samples were taken from both seafloor sediments and flocculent material in an affected deepwater coral community in Mississippi Canyon Block 294 and compared with other *Deepwater Horizon* oil spill-derived samples collected on coastal beaches. While this study did not measure or link toxicity of oil or DOSS to coral tissues, it noted that DOSS was found to persist for 6 months in the samples taken from the coral community and up to 4 years in the beach samples. These findings could present an additional concern if sediments containing DOSS are demonstrated to be toxic to deepwater benthic organisms. Another study of this same area (Hsing et al., 2013), however, indicated that some of the corals with the least damage appear to be improving in health.

Experiments with shallow tropical corals indicate that corals have a high tolerance to oil exposure. The mucus layers on coral resist penetration of oil and slough off the contaminant. Longer exposure times and areas of tissue where oil adheres to the coral are more likely to result in tissue damage and death of polyps. Corals with branching growth forms appear to be more susceptible to damage from oil exposure (Shigenaka, 2001). The most common deepwater coral, *Lophelia pertusa*, is a branching species. Tests with shallow tropical gorgonians indicate relatively low toxic effects to the coral (Cohen et al., 1977), suggesting deepwater gorgonians may have a similar response. Depending on the level of exposure, the response of deepwater coral to oil from a catastrophic spill would vary. Exposure to widely

dispersed oil adhering to organic detritus and partially degraded by bacteria may be expected to result in little effect. Direct contact with plumes of relatively fresh dispersed oil droplets in the vicinity of the incident could cause the death of affected coral polyps through exposure and potential feeding on oil droplets by polyps. Median levels of exposure to dispersed oil in a partly degraded condition may result in effects similar to those of shallow tropical corals, with often no discernible effects other than temporary contraction and some sloughing. The health of corals may be degraded by the necessary expenditure of energy as the corals respond to oiling (Shigenaka, 2001). Communities exposed to more concentrated oil may experience detrimental effects, including death of affected organisms, tissue damage, lack of growth, interruption of reproductive cycles, and loss of gametes. Many invertebrates associated with deepwater coral communities, particularly the crustaceans, would likely be more susceptible to damage from oil exposure. The recolonization of severely damaged or destroyed communities could take years or decades. Burial of hard substrate could permanently prevent recovery. However, because of the scarcity of deepwater hard bottoms, their comparatively low surface area, and the distancing requirements set by BOEM in NTL 2009-G40, it is unlikely that a sensitive habitat would be located adjacent to a seafloor blowout or that concentrated oil would contact the site.

Overall Summary and Conclusion (Phases 1-4)

Deepwater coral communities would potentially be subject to detrimental effects from a catastrophic seafloor blowout. Sediment and oiled sediment from the initial event (Phase 1) could have lethal or sublethal impacts if in close proximity, but they are not likely to reach sensitive deepwater coral communities in heavy amounts because of distancing requirements described in NTL 2009-G40. Fine sediment from a blowout may reach the location of sensitive habitats, producing sublethal effects. The initial accident could result in the drilling rig and equipment falling on a sensitive seafloor habitat if the structure travels more than 610 m (2,000 ft) from the well site.

The ongoing spill event (Phase 2) would have the greatest effect on deepwater coral communities. These communities are at risk from subsea oil plumes that could directly contact localized patches of sensitive habitat. Oil plumes reaching deepwater coral communities could cause oiling of organisms, resulting in the death of entire populations on localized sensitive habitats. However, the potential impacts would be localized due to the directional movement of oil plumes by the water currents and because the sensitive habitats have a scattered, patchy distribution. The more likely result would be exposure to widely dispersed, biodegraded particles that "rain" down from a passing oil plume. While a few patch habitats may be affected, the Gulfwide ecosystem of deepwater coral communities would be expected to suffer no significant effects.

Oil reaching the shore (Phase 3) presents no additional adverse impacts to deepwater coral communities because the communities are located offshore in deep water (>300 m; 610 ft).

The recovery of deepwater coral communities (Phase 4) depends on the severity of initial impacts. A catastrophic spill combined with the application of dispersant has the potential to cause devastating effects on local patches of sensitive habitat in the path of subsea plumes where they physically contact the seafloor. The recolonization of severely damaged or destroyed communities could take years or decades. Burial of hard substrate could permanently prevent recovery. Sublethal effects are possible for communities that receive a lower level of impact. Examples of these effects could include temporary reduction in feeding, expenditure of energy to remove the oil, loss of gametes and reproductive delays, and loss of tissue mass. However, most deepwater coral community habitats are expected to experience no impacts from a catastrophic seafloor blowout because of the directional movement of oil plumes by the water currents and because the habitats have a scattered, patchy distribution.

B.3.1.11. Soft Bottom Benthic Communities

The seafloor on the continental shelf in the Gulf of Mexico consists primarily of muddy to sandy sediments. Benthic organisms found on the seafloor include infauna (animals that live in the substrate, including mostly burrowing worms, crustaceans, and mollusks) and epifauna (animals that live on or are attached to the substrate; mostly crustaceans, as well as echinoderms, mollusks, hydroids, sponges, soft and hard corals, and demersal fishes). Infauna is comprised of meiofauna, small organisms (63-500 µm) that live among the grains of sediment; and macroinfauna, slightly larger organisms (>0.5 mm; 0.02 in) that live in the sediment (Dames and Moore, Inc., 1979). Shrimp and demersal fish are closely associated

with the benthic community. The most abundant organisms on the continental shelf are the deposit-feeding polychaetes. The slope and deep sea consist of vast areas of primarily fine sediments that support benthic communities with lower densities and biomass but higher diversity than the continental shelf (Rowe and Kennicutt, 2001).

Phase 1—Initial Event

A blowout from an oil well could result in a catastrophic spill event. A catastrophic blowout would result in released oil rapidly rising to the sea surface because all known reserves in the GOM have specific gravity characteristics that would preclude oil from sinking immediately after release at a blowout site. The oil would surface almost directly over the source location. However, if the oil is ejected under high pressure, micro-droplets of oil may form and become entrained in the water column (Boehm and Fiest, 1982; Adcroft et al., 2010). The upward movement of the oil may be reduced if methane mixed with the oil is dissolved into the water column, reducing the oil's buoyancy (Adcroft et al., 2010). Large oil droplets would rise to the sea surface, but smaller droplets, formed by vigorous turbulence in the plume or the injection of dispersants, may remain neutrally buoyant in the water column, creating a subsurface plume (Adcroft et al., 2010; Joint Analysis Group, 2010). Dispersed oil in the water column begins to biodegrade and may flocculate with particulate matter, promoting sinking of the particles. Subsea plumes or sinking oil on particulates may contact portions of the seafloor.

A catastrophic blowout outside the well casing and below the seafloor or at the seafloor-water interface could resuspend large quantities of bottom sediments and create a large crater, destroying many organisms within a few hundred meters of the wellhead. Some fine sediment could travel up to a few thousand meters before redeposition, negatively impacting a localized area of benthic communities. The localized seafloor habitat around which a seafloor blowout occurs would be impacted by suspended and redeposited sediment.

A catastrophic blowout that occurs above the seabed (at the rig, along the riser between the seafloor and sea surface, or through leak paths on the BOP/wellhead) would not disturb the sediment.

The use of subsea dispersants would increase the exposure of offshore benthic habitats to dispersed oil droplets in the water column, as well as the chemicals used in the dispersants. The use of subsea dispersants is not likely to occur for seafloor blowouts outside the well casing.

Impacts to Soft Bottom Benthic Communities

Impacts that occur to benthic organisms as a result of a blowout would depend on the type of blowout and their distance from the blowout. Also, if the blowout were to occur beneath the seabed, soft sediment habitat would be destroyed by the formation of a crater, and the suspension and subsequent deposition of disturbed sediment would smother localized areas of benthic communities. A blowout that occurs outside the well casing can rapidly deposit 30 cm (12 in) or more of sediment within a few hundred meters and may smother much of the soft bottom community in a localized area. Benthic communities exposed to large amounts of resuspended and deposited sediments following a catastrophic, subsurface blowout could be subject to smothering, sediment suffocation, and exposure to resuspended toxic contaminants. Impacts to organisms as a result of sedimentation would vary based on species tolerance, degree of sedimentation, length of exposure, burial depth, and vertical migration ability through sediment.

A portion or the entire rig may sink to the seafloor as a result of a blowout. The benthic features and communities upon which the rig settles would be destroyed or smothered. A settling rig may suspend sediments, which may smother nearby benthic communities. The habitats beneath the rig may be permanently lost; however, the rig itself may become an artificial reef upon which epibenthic organisms may settle. The surrounding benthic communities that were smothered by sediment would repopulate from nearby stocks through spawning recruitment and immigration if the hard substrate upon which they live was not physically destroyed.

Phase 2—Offshore Spill

A spill from a shallow-water blowout could impact benthic communities on the continental shelf. The scenario (**Table B-4**) for a catastrophic spill on the continental shelf is assumed to last 2-5 months and to release 30,000 bbl per day. A total volume of 0.9-3.0 MMbbl of South Louisiana midrange

paraffinic sweet crude oil could be released, which would float (APIº >10). An anticipated 35,000 bbl of dispersant may be applied to the surface waters.

A spill from a deepwater blowout could also impact shelf communities and deepwater communities. The scenario (**Table B-4**) for a catastrophic spill in deep water is assumed to last 4-6 months and to release 30,000-60,000 bbl per day. A total volume of 2.7-7.2 MMbbl of South Louisiana midrange paraffinic sweet crude oil could be released, which would float (APIº >10). Oil properties may change as it passes up the well and through the water column, and it may become emulsified. An anticipated 33,000 bbl of dispersant may be applied to the surface waters and 16,500 bbl may be applied subsea. Weathering and dilution of the oil would also occur as it travels from its launch point. It is unlikely that a subsurface plume from a deepwater blowout would impact shelf communities. The oil is anticipated to remain in deep water and be directed by water currents in the deep water. These currents do not typically transit from deep water up onto the shelf (Pond and Pickard, 1983; Inoue et al., 2008).

Impacts to Soft Bottom Benthic Communities

Impacts from Surface Oil

Surface oil slicks can spread over a large area; however, the majority of the slick is comprised of a very thin surface layer of oil moved by winds and currents (Lewis and Aurand, 1997). The potential of surface oil slicks to affect benthic habitats is limited by its ability to mix into the water column. Soft bottom benthic communities below 10-m (33-ft) water depth are protected from surface oil because of its lack of ability to mix with water (Lange, 1985; McAuliffe et al., 1975 and 1981a; Tkalich and Chan, 2002). Benthic organisms would not become physically coated or smothered by surface oil. However, if this surface oil makes its way into the water column through physical mixing, the use of dispersants, or the sedimenting to particles in the water column, benthic communities may be impacted. These scenarios are discussed in later sections.

Disturbance of the sea surface by storms can mix surface oil into the water column, but the effects are generally limited to the upper 10-20 m (33-66 ft) (Lange, 1985; McAuliffe et al., 1975 and 1981a; Tkalich and Chan, 2002). Therefore, soft bottom benthic communities located in shallow water have the potential to be fouled by oil that is floating on shallow water and mixes to the depth of the seafloor. Nearshore oil deposits that occur in sheltered areas, such as bays, may remain in the sediment and impact organisms for long periods. Oil in nearshore sediments was found in high concentrations 8 years following the *Exxon Valdez* spill (Dean and Jewett, 2001). Benthic communities located in deeper water would not be impacted by oil physically mixed into the water column. However, if dispersants are used, they would enable oil to mix into the water column and possibly impact organisms in deeper water. Dispersants are discussed later in this chapter. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

Impacts from Subsurface Oil

The presence of a subsurface oil plume on the continental shelf from a shallow-water blowout may affect soft bottom benthic communities. A majority of the oil released is expected to rise rapidly to the sea surface above the launch point because of the specific gravity characteristics of the oil reserves in the GOM, thus not directly sinking to the seafloor and smothering benthic communities. If the oil is ejected under high pressure, oil droplets may become entrained in the water column (Boehm and Fiest, 1982; Adcroft et al., 2010). The upward movement of the oil may be reduced if methane mixed with the oil is dissolved into the water column, reducing the oil's buoyancy (Adcroft et al., 2010). Large oil droplets would rise to the sea surface, but smaller droplets, formed by vigorous turbulence in the plume or the injection of dispersants, may remain neutrally buoyant in the water column, creating a subsurface plume (Adcroft et al., 2010; Joint Analysis Group, 2010). Dispersed oil in the water column begins to biodegrade and may flocculate with particulate matter, promoting sinking of the particles. Subsurface plumes generated by high-pressure dissolution of oil may come in contact with portions of the seafloor as it travels from the source. A sustained spill would continuously create surface slicks and possibly subsurface plumes. Some of the oil in the water column will become diluted or evaporated over time, reducing any localized transport to the seafloor (Vandermeulen, 1982). In addition, microbial degradation of the oil occurs in the water column so that the oil would be less toxic as it travels from the source (Hazen et al., 2010). However, a sustained spill may result in elevated exposure concentrations to benthic

communities if the plume reaches them. The longer the spill takes to stop, the longer the exposure time and higher the exposure concentration may be.

Soft bottom infaunal communities that come into direct contact with oil may experience sublethal and/or lethal effects. The greatest effects of oil exposure would occur close to the well and impacts would decrease with distance. A subsurface plume that contacts the seafloor may result in acute toxicity. The water accommodated fraction (WAF) or water soluble fraction (WSF) of oil that dissolves in water may be the most toxic to organisms, especially larvae and embryos in the water column or at the water sediment interface. Lethal effects for marine invertebrates have been reported at exposures between 0.10 ppm to 100 ppm WSF of oil (Suchanek, 1993). The WSF of petroleum hydrocarbons was reportedly highly toxic to the embryos of oysters and sea urchins, while sediment containing weathered fuel was not toxic to the same species (Beiras and Saco-Álvarez, 2006). Quahog clam embryos and larvae also experienced toxicity and deformation of several different crude oils at WSF concentrations between 0.10 ppm and 10 ppm (Byrne and Calder, 1977). An experiment indicated that the WSF of No. 2 fuel oil at a concentration of 5 ppm disrupted the cellular development of 270 out of 300 test organisms within 3 hours of exposure (Byrne, 1989). After 48 hours exposure, all of the test organisms died and the 48-hour LC_{50} (lethal concentration for 50% of the test population) was calculated to be 0.59 ppm (Byrne, 1989). Another experiment indicated that a WSF of 0.6 ppm and greater of No. 2 fuel oil depressed respiration, reduced mobility of sperm, interfered with cell fertilization and embryonic cleavage, and retarded larval development of sand dollar eggs (Nicol et al., 1977). Experiments that exposed sea urchin embryos to 10-30 ppm WSF of diesel oil for 15-45 days resulted in defective embryonic development and nonviable offspring (Vashchenko, 1980). Therefore, any dissolved petroleum hydrocarbon constituents that reach larval benthic organisms may cause acute toxicity and other developmental effects to this life stage. The WAF and WSF, however, should be considered "worst-case scenario" values as they are based on a closed system at equilibrium with the contaminant and, due to its size and complexity, the GOM will not reach equilibrium with released oil.

Oil in the water column may impact pelagic eggs and larvae of invertebrates. Toxicity tests indicated that eggs of many species were killed by diesel oil in seawater, and in general, the smaller eggs died earlier (Chia, 1973). Bivalve fertilization and sperm fertility were depressed with exposure to crude oil (Renzoni, 1975). The WSF of crude oil was also highly toxic to gametes, embryos, and larvae of bivalves (Renzoni, 1975). Oil concentrations of 0.1 and 1 ppm caused a decrease in fertilization, development of embryos, survival or larvae, and larval growth in the bivalves *Crassostrea virginica* and *Mulinia lateralis* (Renzoni, 1975). Another experiment, however, calculated the LC_{50} for a 6-hour exposure of the gametes, eggs, and larvae of three bivalves (*Crassostrea angulata*, *Crassostrea gigas*, and *Mytilus galloprovincialis*) to be 1,000 ppm oil and 1,000 ppm oil plus dispersant (Renzoni, 1973). Toxicity varies widely among species and oil types.

Sublethal responses of marine invertebrates may result in population level changes (Suchanek, 1993). Such sublethal responses may occur at concentrations as low as 1-10 ppb (Hyland and Schneider, 1976). Sublethal impacts may include reduced feeding rates, reduced ability to detect food, ciliary inhibition, reduced movement, decreased aggression, and altered respiration (Suchanek, 1993).

The farther a subsea plume travels, the more physical and biological changes occur to the oil before it reaches benthic organisms. Oil would become diluted as it physically mixes with the surrounding water, and significant evaporation occurs from surface slicks. The most toxic compounds of oil are lost within the first 24 hours of a spill, leaving the heavier, less toxic compounds in the system (Ganning et al., 1984). An even greater component of the lighter fuel oils dissipates through evaporation. Water currents could carry a plume to contact the seafloor directly, but a likely scenario would be for the oil to adhere to other particles and precipitate to the seafloor, much like rainfall (International Tanker Owners Pollution Federation Limited, 2011; Kingston et al., 1995). Oil also would reach the seafloor through consumption by plankton, with excretion distributed over the seafloor (International Tanker Owners Pollution Federation Limited, 2011). The longer and farther a subsea plume travels in the sea, the more dilute the oil would be (Vandermeulen, 1982; Tkalich and Chan, 2002). In addition, microbial degradation of the oil occurs in the water column, reducing toxicity (Hazen et al., 2010; McAuliffe et al., 1981b). The oil would move in the direction of prevailing currents (S.L. Ross Environmental Research Ltd., 1997) and, although the oil would weather with the distance it travels, low levels of oil transported in subsea plumes would impact benthic communities. These mechanisms would result in a wide distribution of small amounts of oil. This oil would be in the process of biodegradation from bacterial action, which would

continue on the seafloor, resulting in scattered microhabitats with an enriched carbon environment (Hazen et al., 2010).

Localized areas of lethal effects would be recolonized by populations from neighboring soft bottom substrate once the oil in the sediment has been sufficiently reduced to a level able to support marine life (Sanders et al., 1980; Lu and Wu, 2006; Ganning et al., 1984; Gómez Gesteira and Dauvin, 2000; Dean and Jewett, 2001). This initial recolonization process may be fairly rapid, but full recovery may take up to 10 years depending on the species present, substrate in the area, toxicity of oil spilled, concentration and dispersion of oil spilled, and other localized environmental factors that may affect recruitment (Kingston et al., 1995; Gómez Gesteira and Dauvin, 2000; Sanders et al., 1980; Conan, 1982). Opportunistic species would take advantage of the barren sediment, repopulating impacted areas first. These species may occur within the first recruitment cycle of the surrounding populations or from species immigration from surrounding stocks and may maintain a stronghold in the area until community succession begins (Rhodes and Germano, 1982; Sanders et al., 1980).

It is unlikely that a subsurface plume from a deepwater blowout would impact shelf communities. The oil is anticipated to remain in deep water and be directed by water currents in the deep water. These currents do not typically transit from deep water up onto the shelf (Pond and Pickard, 1983; Inoue et al., 2008). However, the impacts to deepwater soft bottom benthic communities as a result of a blowout would similar to those on the continental shelf.

Impacts from Dispersed Oil

If dispersants are used at the sea surface, oil may mix into the water column, and if they are applied subsea, dispersed oil can travel with currents and contact the seafloor. Chemically dispersed oil from a surface slick is not anticipated to result in lethal exposures to organisms on the seafloor. The chemical dispersion of oil may increase the weathering process and allow surface oil to be diluted by greater amounts of water. Reports on dispersant usage on surface plumes indicate that a majority of the dispersed oil remains in the top 10 m (33 ft) of the water column, with 60 percent of the oil in the top 2 m (6 ft) (McAuliffe et al., 1981a). Dispersant usage also reduces the oil's ability to stick to particles in the water column, minimizing oiled sediments from traveling to the seafloor (McAuliffe et al., 1981a). If applied, subsea benthic communities near the source could be exposed to dispersed oil that is concentrated enough to harm the benthic community. If the oil remains suspended for a longer period of time, it would be more dispersed and less concentrated. There is very little information on the behavior of subsea dispersants.

Dispersed oil used at the sea surface reaching the benthic communities in the Gulf of Mexico would be expected to be at very low concentrations (<1 ppm) (McAuliffe et al., 1981a). Such concentrations would not be life threatening to larval or adult stages on the seafloor based on experiments conducted with benthic and pelagic species (Scarlett et al., 2005; Hemmer et al., 2010; George-Ares and Clark, 2000). Any dispersed oil in the water column that comes in contact with benthic communities may evoke short-term negative responses by the organisms (Scarlett et al., 2005). Sublethal responses may include reduced feeding rate, erratic movement, and tentacle retraction (Scarlett et al., 2005). In addition, although dispersants were detected in waters off Louisiana after the *Macondo* well blowout and spill, they were below USEPA benchmarks of chronic toxicity (OSAT, 2010). The rapid dilution of dispersants in the water column and lack of transport to the seafloor was also reported by OSAT (2010) where no dispersants were detected in sediment on the Gulf floor following the *Macondo* well blowout and spill.

Impacts from Oil Adhering to Sediments

Oiled sediment that settles to the seafloor may affect organisms upon which it settles. The greatest impacts would be closest to the well where organisms may become smothered by particles and exposed to hydrocarbons. High concentrations of suspended sediment in the water column may lend to large quantities of oiled sediment (Moore, 1976). Deposition of oiled sediment is anticipated to begin occurring within days or weeks of the spill and may be fairly deep near the source (Ganning et al., 1984; Gómez Gesteira and Dauvin, 2000). Oily sand layers were reported to be 10 cm (4 in) deep on the seafloor near the *Amoco Cadiz* spill (Gómez Gesteira and Dauvin, 2000). Acute toxicity may occur near the spill, eliminating benthic communities.

Much of the oil released from a blowout would rise to the sea surface, therefore dispersing the released oil before it makes its way back to the seafloor through flocculation, by deposition from organisms that pass it through their systems with food, and by adhering to sinking particles in the water column. In addition, small droplets of oil that are entrained in the water column for extended periods of time may migrate a great distance from their point of release and may attach to suspended particles in the water column and later be deposited on the seafloor (McAuliffe et al., 1975). The majority of organisms exposed to oiled sediment are anticipated to experience low-level concentrations because as the oiled sediments settle to the seafloor they are widely dispersed. Impacts may include reduced recruitment success, reduced growth, and altered community composition as a result of impaired recruitment.

Impacts from Oil-Spill-Response Activity

Continued localized disturbance of soft bottom communities may occur during oil-spill response efforts. Anchors used to set booms to contain oil or vessel anchors in decontamination zones may affect infaunal communities in the response activity zone. Infaunal communities may be altered in the anchor scar, and deposition of suspended sediment may result from the setting and resetting of anchors. The disturbed benthic community should begin to repopulate from the surrounding communities during their next recruitment event and through immigration of organisms from surrounding stocks. Any decontamination activities, such as cleaning vessel hulls of oil, may also contaminate the sediments of the decontamination zone, as some oil may settle to the seabed, impacting the underlying benthic community.

If a blowout occurs at the seafloor, drilling muds (primarily barite) may be pumped into a well in order to "kill" it. If a kill is not successful, the mud (possibly tens of thousands of barrels) may be forced out of the well and deposited on the seafloor near the well site. Any organisms beneath heavy layers of the extruded drilling mud would be buried. Base fluids of drilling muds are designed to be low in toxicity and biodegradable in offshore marine sediments (Neff et al., 2000). However, as bacteria and fungi break down the drilling fluids, the sediments may temporarily become anoxic (Neff et al., 2000). Benthic macrofaunal recovery would occur when drilling mud concentrations are reduced to levels that enable the sediment to become re-oxygenated (Neff et al., 2000). Complete community recovery from drilling mud exposure may take 3-5 years, although microbial degradation of drilling fluids, followed by an influx of tolerant opportunistic species, is anticipated to begin almost immediately (Neff et al., 2000). In addition, the extruded mud may bury hydrocarbons from the well, making them a hazard to the infaunal species and difficult to remove.

Phase 3—Onshore Contact

There would likely be no additional adverse impacts to soft bottom benthic communities as a result of events and the potential impact producing factors that could occur throughout Phase 3 of a catastrophic spill because these soft bottom benthic communities are located below the water line.

Phase 4—Post-Spill, Long-Term Recovery and Response

Benthic Habitats

In situations where soft bottom infaunal communities are negatively impacted, recolonization by populations from neighboring soft bottom substrate would be expected over a relatively short period. Recolonization would begin with recruitment and immigration of opportunistic species from surrounding stocks. More complex communities would follow with time. Repopulation could take longer for areas affected by direct oil contact in higher concentrations.

Many of the organisms on soft bottoms live within the sediment and have the ability to migrate upward in response to burial by sedimentation. A blowout that occurs outside the well casing can rapidly deposit 30 cm (12 in) or more of sediment within a few hundred meters and may smother much of the soft bottom community in a localized area. In situations where soft bottom infaunal communities are negatively impacted, recolonization by populations from neighboring soft bottom substrate would be expected over a relatively short period of time for all size ranges of organisms, in a matter of days for bacteria, and probably less than 1 year for most macrofauna and megafauna species. Recolonization could take longer for areas affected by direct contact of concentrated oil. Initial repopulation from nearby stocks of pioneering species, such as tube-dwelling polychaetes or oligochaetes, may begin with the next

recruitment event (Rhodes and Germano, 1982). Full recovery would follow as later stages of successional communities overtake the pioneering species (Rhodes and Germano, 1982). The time it takes to reach a climax community may vary depending on the species and degree of impact. Full benthic community recovery may take years to decades if the benthic habitat is heavily oiled (Gómez Gesteira and Dauvin, 2000; Sanders et al., 1980; Conan, 1982). A slow recovery rate would result in a community with reduced biological diversity and possibly a lesser food value for predatory species.

Localized areas of lethal effects would be recolonized by populations from neighboring soft bottom substrate once the oil in the sediment has been sufficiently reduced to a level able to support marine life (Sanders et al., 1980; Lu and Wu, 2006; Ganning et al., 1984; Gómez Gesteira and Dauvin, 2000; Dean and Jewett, 2001). This initial recolonization process may be fairly rapid, but full recovery may take up to 10 years depending on the species present, substrate in the area, toxicity of oil spilled, concentration and dispersion of oil spilled, and other localized environmental factors that may affect recruitment (Kingston et al., 1995; Gómez Gesteira and Dauvin, 2000; Sanders et al., 1980; Conan, 1982). Opportunistic species would take advantage of the barren sediment, repopulating impacted areas first. These species may occur within the first recruitment cycle of the surrounding populations or from species immigration from surrounding stocks and may maintain a stronghold in the area until community succession begins (Rhodes and Germano, 1982; Sanders et al., 1980).

Overall Summary and Conclusion (Phases 1-4)

A catastrophic blowout and spill would have the greatest impact on the soft bottom benthic communities in the immediate vicinity of the spill. Turbidity, sedimentation, and oiling would be heaviest closest to the source, and decrease with distance from the source. Complete loss of benthic populations may occur with heavy sedimentation and oil deposition. Farther from the well, a less thick layer of sediment would be deposited and oil would be dispersed from the source, resulting in sublethal impacts. The recovery of benthic populations would begin with recruitment from surrounding areas fairly rapidly.

B.3.1.12. Marine Mammals

Phase 1—Initial Event

Phase 1 of the scenario is the initiation of a catastrophic blowout event. Impacts, response, and intervention depend on the spatial location of the blowout and leak. For this analysis, an explosion and subsequent fire are assumed to occur. If a blowout associated with the drilling of a single exploratory well occurs, this could result in a fire that would burn for 1 or 2 days. If a blowout occurs on a production platform, other wells could feed the fire, allowing it to burn for over a month. The drilling rig or platform may sink. If the blowout occurs in shallow water, the sinking rig or platform may land in the immediate vicinity; if the blowout occurs in deep water, the rig or platform could land a great distance away, beyond avoidance zones. Regardless of water depth, the immediate response would be from search and rescue vessels and aircraft, such as USCG cutters, helicopters, and rescue planes, and firefighting vessels. Potential impacts reflect the explosion, subsequent fire for 1-30 days, and the sinking of the platform in the immediate vicinity and up to 1 mi (1.6 km) from the well.

Depending on the type of blowout, the pressure waves and noise generated by the eruption of gases and fluids would likely be significant enough to harass, injure, or kill marine mammals, depending on the proximity of the animal to the blowout. A high concentration of response vessels could result in harassment or displacement of individuals and could place marine mammals at a greater risk of vessel collisions, which would likely cause fatal injuries.

The scenarios for each phase, including cleanup methods, can be found in **Table B-4**.

Phase 2—Offshore Spill

Phase 2 of the analysis focuses on the spill and response in Federal and State offshore waters. A catastrophic spill would likely spread hundreds of square miles. Also, the oil slick may break into several smaller slicks, depending on local wind patterns that drive the surface currents in the spill area. Potential impacts reflect spill and response in Federal and State offshore waters. Season and temperature variations

can result in different resource impacts due to variations in oil persistence and oil and dispersant toxicity and because of differences in potential exposure of the resources throughout various life cycle stages.

An oil spill and related spill-response activities can impact marine mammals that come into contact with oil and remediation efforts. The marine mammals' exposure to hydrocarbons persisting in the sea may result in sublethal impacts (e.g., decreased health, reproductive fitness, longevity, and increased vulnerability to disease), some soft tissue irritation, respiratory stress from inhalation of toxic fumes, food reduction or contamination, direct ingestion of oil and/or tar, fouling of baleen plates, and temporary displacement from preferred habitats or migration routes. More detail on the potential range of effects to marine mammals from contact with spilled oil can be found in Geraci and St. Aubin (1990). The best available information does not provide a complete understanding of the effects of the spilled oil and active response/cleanup activities on marine mammals.

The increased human presence after an oil spill (e.g., vessels) would likely add to changes in behavior and/or distribution, thereby potentially stressing marine mammals further and perhaps making them more vulnerable to various physiologic and toxic effects. In addition, the large number of response vessels could place marine mammals at a greater risk of vessel collisions, which could cause fatal injuries.

The potential biological removal (PBR) level is defined by the Marine Mammal Protection Act as the maximum number of animals, not including natural mortalities that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. However, in the Gulf of Mexico, many marine mammal species have unknown PBRs or PBRs with outdated abundance estimates, which are considered undetermined. The biological significance of any injury or mortality would depend, in part, on the size and reproductive rates of the affected stocks, as well as the number, age, and size of the marine mammals affected.

Although the *Deepwater Horizon* explosion, oil spill, and response (including use of dispersants) has provided some information on marine mammals that came into contact with oil and remediation efforts, characteristics of oil spill and oil spill response impacts to marine mammals would depend on the magnitude, frequency, location, and date of accidents; characteristics of spilled oil; spill-response capabilities and timing; and various meteorological and hydrological factors. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

Phase 3—Onshore Contact

Phase 3 focuses on nearshore (e.g., inside bays and in close proximity to shoreline) and onshore spill response and oil initially reaching the shoreline during the spill event or while the oil still persists in the offshore environment once the spillage has been stopped. It is likely that Phases 2 and 3 could occur simultaneously. The duration of the initial shoreline oiling is measured from initial shoreline contact until the well is capped or killed and the remaining oil dissipates offshore. Re-oiling of already cleaned or previously impacted areas could be expected during Phase 3. In addition to the response described in Phase 2, nearshore and onshore efforts would be introduced in Phase 3 as oil entered coastal areas and contacted shore. Potential impacts reflect the spill and response in very shallow coastal waters and once along the shoreline. Season and temperature variations can result in different resource impacts due to variations in oil persistence and oil and dispersant toxicity and because of differences in potential exposure of the resources throughout various life cycle stages.

A high-volume oil spill lasting 90 days could directly impact over 22 species of marine mammals. As a spill enters coastal waters, manatees and coastal and estuarine dolphins would be the most likely to be affected.

Manatees primarily inhabit open coastal (shallow nearshore) areas and estuaries, and they are also found far up in freshwater tributaries. Florida manatees have been divided into four distinct regional management units: the Atlantic Coast Unit that occupies the east coast of Florida, including the Florida Keys and the lower St. Johns River north of Palatka, Florida; the Southwest Unit that occurs from Pasco County, Florida, south to Whitewater Bay in Monroe County, Florida; the Upper St. Johns River Unit that occurs in the river south of Palatka, Florida; and the Northwest Unit that occupies the Florida Panhandle south to Hernando County, Florida (Waring et al., 2012). Manatees from the Northwest Unit are more likely to be seen in the northern GOM, and they can be found as far west as Texas; however, most sightings are in the eastern GOM (Fertl et al., 2005).

During warmer months (June to September), manatees are common along the Gulf Coast of Florida from the Everglades National Park northward to the Suwannee River in northwestern Florida. Although

manatees are less common farther westward, manatee sightings increase during the warmer summer months. Winter habitat use is primarily influenced by water temperature as animals congregate at natural (springs) and/or artificial (power plant outflows) warm water sources (Alves-Stanley et al., 2010). Manatees are infrequently found as far west as Texas (Powell and Rathbun, 1984; Rathbun et al., 1990; Schiro et al., 1998). If a catastrophic oil spill reached the Florida coast when manatees were in or near coastal waters, the spill could have population-level effects.

It is possible that manatees could occur in coastal areas where vessels traveling to and from the spill site could affect them. A manatee present where there is vessel traffic could be injured or killed by a vessel strike (Wright et al., 1995). Due to the large number of vessels responding to a catastrophic spill both in coastal waters and traveling through coastal waters to the offshore site, manatees would have an increased risk of collisions with boats. Vessel strikes are the primary cause of death of manatees.

In February 2014, there were 114 manatee carcasses collected in Florida, 20 of these animals died of human causes (Florida Fish and Wildlife Conservation Commission, 2014). Human causes included water control structures, entanglement in and ingestion of marine debris, entrapment in pipes/culverts, and collisions with watercraft. Seventy percent of the manatees that died of human causes were killed by watercraft (Florida Fish and Wildlife Conservation Commission, 2014). Therefore, if a catastrophic spill and response vessel traffic occurred near manatee habitats in the eastern Gulf of Mexico, population-level impacts could occur because the possibility exists for the number of mortalities to exceed the potential biological removal.

There have been no experimental studies and only a few observations suggesting that oil impacts have harmed any manatees (St. Aubin and Lounsbury, 1990). Types of impacts to manatees and dugongs from contact with oil include (1) asphyxiation because of inhalation of hydrocarbons, (2) acute poisoning because of contact with fresh oil, (3) lowering of tolerance to other stress because of the incorporation of sublethal amounts of petroleum components into body tissues, (4) nutritional stress through damage to food sources, and (5) inflammation or infection and difficulty eating because of oil sticking to the sensory hairs around their mouths (Preen, 1989, in Sadiq and McCain, 1993; Australian Maritime Safety Authority, 2003). For a population whose environment is already under great pressure, even a localized incident could be significant (St. Aubin and Lounsbury, 1990). Spilled oil might affect the quality or availability of aquatic vegetation, including seagrasses, upon which manatees feed.

Bottlenose dolphins were the most affected species of marine mammals from the *Deepwater Horizon* explosion, oil spill, and response. Bottlenose dolphins can be found throughout coastal waters in the Gulf of Mexico. Like manatees, dolphins could be affected, possibly to population level, by a catastrophic oil spill if it reaches the coast (as well as affecting them in the open ocean), through direct contact, inhalation, ingestion, and stress, as well as through collisions with cleanup vessels.

Phase 4—Post-Spill, Long-Term Recovery and Response

Phase 4 focuses on long term recovery once the well has been capped and the spill has stopped. During the final phase of a catastrophic blowout and spill, it is presumed that the well has been capped or killed and cleanup activities are concluding. While it is assumed that the majority of spilled oil would be dissipated offshore within 1-2 months (depending on season and temperature) of stopping the flow, oil has the potential to persist in the environment long after a spill event and has been detected in sediment 30 years after a spill. On sandy beaches, oil can sink deep into the sediments. In tidal flats and salt marshes, oil may seep into the muddy bottoms. Potential impacts reflect long term persistence of oil in the environment and residual and long term cleanup efforts.

Even after the spill is stopped, oilings or deaths of marine mammals would still likely occur because of oil and dispersants persisting in the water, past marine mammal/oil or dispersant interactions, and ingestion of contaminated prey. The animals' exposure to hydrocarbons persisting in the sea may result in sublethal 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. A catastrophic oil spill could lead to increased mortalities, resulting in potential population-level effects for some species/populations (USDOC, NMFS, 2010a).

The GOM Unusual Mortality Event (UME) investigation and the Deepwater Horizon Natural Damage Resource Assessment determined that the *Deepwater Horizon* explosion, oil spill (considered a catastrophic spill), and response resulted in the death of marine mammals and is the most likely

explanation of the persistent, elevated stranding numbers in the northern Gulf of Mexico after the spill. Data have supported that the adrenal and lung disease observed in dolphins was most likely due to exposure to petroleum products from the spill event. This has resulted in both dolphin mortalities, which peaked from March 2010-July 2014, and fetal loss. Research, while ongoing, suggests that the effect on these populations has not ended, with evidence of failed pregnancies found in 2015 (USDOC, NMFS, 2016).

Although data have suggested that exposure to petroleum products may result in reproductive failure, other factors have the potential to affect marine mammal reproduction and were also observed during the timeframe of this UME. In addition to investigating all other potential causes, scientists are still investigating what role *Brucella* plays in the northern Gulf of Mexico UME. *Brucella* is a gram-negative, intracellular bacterium that has been isolated from many marine mammal species globally (Nymo et al., 2011; Guzmán-Verri et al., 2012; Hernández-Mora et al., 2013) and may cause placentitis and sporadic late-term abortion (Miller et al., 1999; Dagleish et al., 2008; Guzmán-Verri et al., 2012; Hernández-Mora et al., 2013). As of October 27, 2015, 68 out of 210 dolphins tested were positive or suspected positive for *Brucella*. Future investigations on immune function in Gulf of Mexico dolphins are needed to determine whether exposure to hydrocarbons during the *Deepwater Horizon* oil spill or other environmental stressors may have caused an increased susceptibility to infectious agents that affect the fetal-placental unit or other conditions leading to late-term fetal loss (Colegrove et al., 2016). More detail on *Brucella* and its role in the UME can be found on NMFS's website (USDOC, NMFS, 2016). Furthermore, a study by Carmichael et al. (2012) suggested that natural stressors combined with the *Deepwater Horizon* explosion, oil spill, and response may have created a "perfect storm" for bottlenose dolphins in the northern Gulf of Mexico. Many coastal species in the northern Gulf of Mexico, including dolphins, experienced unusually harsh winter conditions in early 2010, which were followed by the *Deepwater Horizon* explosion, oil spill, and response. A third potential stressor was introduced in January 2011 when large volumes of cold freshwater, associated with melt water from an unusually large winter snowfall near the Mobile Bay watershed, entered the nearshore coastal systems very rapidly. This event happened days prior to the start of unusually high numbers of perinatal (near term to neonatal) bottlenose dolphin mortalities in the northern Gulf of Mexico from January to April 2011.

Overall Summary and Conclusion (Phases 1-4)

Accidental blowouts, oil spills, and spill-response activities may impact marine mammals in the GOM. Depending on the type of blowout and the proximity of a marine mammal species to the area, an eruption of gases and fluids may generate not only a toxic effect but also pressure waves and noise significant enough to injure or kill a marine mammal in the immediate vicinity (Phase 1). However, marine mammals are very wide-ranging and occupy the entire Gulf of Mexico, making the chance of a marine mammal being present at the exact location and moment of a blowout highly unlikely. Characteristics of impacts (i.e., acute vs. chronic impacts) depend on the magnitude, frequency, location, and date of accidents; characteristics of spilled oil; spill-response capabilities and timing; and various meteorological and hydrological factors. Impacts that may affect an individual or group of individuals include vessel collisions; soft-tissue irritation; respiratory stress from inhalation of toxic fumes; food reduction or contamination; direct ingestion of oil and/or tar; fouling of baleen plates; increased vulnerability to disease; temporary displacement from preferred habitats or migration routes; and decreased health, reproductive fitness, and longevity (Phase 2 and Phase 3). Even after the spill is stopped, oilings or deaths of marine mammals would still likely occur because of oil and dispersants persisting in the water, past marine mammal/oil or dispersant interactions, and ingestion of contaminated prey (Phase 4). The animals' exposure to hydrocarbons persisting in the sea may result in sublethal 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. There is potential for a low-probability catastrophic event to result in both individual and population-level effects on affected marine mammal species.

B.3.1.13. Sea Turtles

Phase 1—Initial Event

Phase 1 of the scenario is the initiation of a catastrophic blowout incident. Impacts, response, and intervention depend on the spatial location of the blowout and leak. For this analysis, an explosion and subsequent fire are assumed to occur. If a blowout associated with the drilling of a single exploratory well occurs, this could result in a fire that would burn for 1-2 days. If a blowout occurs on a production platform, other wells could feed the fire, allowing it to burn for over a month. The drilling rig or platform may sink. If the blowout occurs in shallow water, the sinking rig or platform may land in the immediate vicinity; if the blowout occurs in deep water, the rig or platform could land a great distance away, beyond avoidance zones. Regardless of water depth, the immediate response would be from search and rescue vessels and aircraft, such as USCG cutters, helicopters, and rescue planes, and firefighting vessels. Potential impacts reflect the explosion, subsequent fire for 1-30 days, and the sinking of the platform in the immediate vicinity and up to 1 mi (1.6 km) from the well.

Five species of sea turtles are found in the waters of the Gulf of Mexico: green, leatherback, hawksbill, Kemp's ridley, and loggerhead. All species are protected under the Endangered Species Act (ESA), and all are listed as endangered except the loggerhead turtle, which is listed as threatened. Depending on the type of blowout, an eruption of gases and fluids may generate significant pressure waves and noise that may harass, injure, or kill sea turtles, depending on their proximity to the accident. A high concentration of response vessels could place sea turtles at a greater risk of fatal injuries from vessel collisions. All sea turtle species and life stages are vulnerable to the harmful effects of oil through direct contact or by fouling of their habitats and prey.

Further, mitigation by burning puts turtles at risk because they tend to be gathered up in the corralling process necessary to concentrate the oil in preparation for the burning. Trained observers should be required during any mitigation efforts that include burning. The scenarios for each phase, including cleanup methods, can be found in **Table B-4**.

Phase 2—Offshore Spill

Phase 2 of the analysis focuses on the spill and response in Federal and State offshore waters. A catastrophic spill would likely spread hundreds of square miles. Also, the oil slick may break into several smaller slicks, depending on local wind patterns that drive the surface currents in the spill area. Potential impacts reflect spill and response in Federal and State offshore waters. Season and temperature variations can result in different resource impacts due to variations in oil persistence and oil and dispersant toxicity and because of differences in potential exposure of the resources throughout various life cycle stages.

Sea turtles are more likely to be affected by a catastrophic spill in shallow water than in deep water because not all sea turtles occupy a deepwater habitat. For example, Kemp's ridley sea turtles are unlikely to be in water depths of 160 ft (49 m) or greater. Hawksbill sea turtles are commonly associated with coral reefs, ledges, caves, rocky outcrops, and high energy shoals. Green sea turtles are commonly found in coastal benthic feeding grounds, although they may also be found in the convergence zones of the open ocean. Convergence zones are areas that also may collect oil. Leatherback sea turtles are commonly pelagic and are the sea turtle species most likely to be affected by a deepwater oil spill. As the spilled oil moves toward land, additional species of sea turtles are more likely to be affected.

The *Deepwater Horizon* explosion, oil spill, and response in Mississippi Canyon Block 252 (including use of dispersants) have impacted sea turtles that have come into contact with oil and remediation efforts. For the latest available information on oiled or affected sea turtles documented in the area, refer to NMFS's "2010 Gulf of Mexico Oil Spill: Sea Turtles, Dolphins, and Whales" website (USDOC, NMFS, 2014a).

According to this NMFS website, approximately 450 sea turtles were collected, rehabilitated, and released back into the wild and over 600 turtles were found dead during the *Deepwater Horizon* response as of October 10, 2014. Of these, about 75 percent of the deceased turtles were Kemp's ridley turtles and 95 percent of the released turtles were loggerhead sea turtles (USDOC, NMFS, 2014a). Individuals were documented either through strandings or directed offshore captures. Due to low detection rates of carcasses in prior events, it is possible that the number of deaths of sea turtles is underestimated (Epperly et al., 1996). It is also important to note that evaluations have not yet confirmed the cause of death, and it is possible that not all carcasses were related to the *Deepwater Horizon* explosion, oil spill, and response.

Over the last 5 years, NOAA has documented increased numbers of sea turtle strandings in the northern GOM. Many of the stranded turtles were reported from Mississippi and Alabama waters, and very few showed signs of external oiling (believed to be related to the *Deepwater Horizon* explosion, oil spill, and response). Necropsy results from many of the stranded turtles indicate mortality due to forced submergence, which is commonly associated with fishery interactions. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

The *Ixtoc I* well blowout and spill in the Bay of Campeche, Mexico, on June 3, 1979, resulted in the release of 500,000 metric tons (140 million gallons) of oil and the transport of this oil into the Gulf of Mexico (ERCO, 1982). Three million gallons of oil impacted Texas beaches (ERCO, 1982). According to the ERCO study, "Whether or not hypoxic conditions could, in fact, be responsible for areawide reductions in [invertebrate] faunal abundance is unclear, however." Of the three sea turtles found dead in the U.S., all had petroleum hydrocarbons in the tissues examined, and there was selective elimination of portions of this oil, indicating chronic exposure (Hall et al., 1983). Therefore, the effects of the *Ixtoc I* well blowout and spill on sea turtles in waters off Texas are still unknown.

Phase 3—Onshore Contact

Phase 3 focuses on nearshore (e.g., inside bays and in close proximity to shoreline) and onshore spill response, and on oil initially reaching the shoreline during the spill event or while the oil still persists in the offshore environment once the spillage has been stopped. It is likely that Phases 2 and 3 could occur simultaneously. The duration of the initial shoreline oiling is measured from initial shoreline contact until the well is capped or killed and the remaining oil dissipates offshore. The re-oiling of already cleaned or previously impacted areas could be expected during Phase 3. In addition to the response described in Phase 2, nearshore and onshore efforts would be introduced in Phase 3 as oil entered coastal areas and contacted shore. Potential impacts reflect the spill and response in very shallow coastal waters and once along the shoreline. Season and temperature variations can result in different resource impacts due to variations in oil persistence and oil and dispersant toxicity and because of differences in potential exposure of the resources throughout various life cycle stages.

Out of the five species of sea turtle that occur in the Gulf of Mexico, only four nest in the GOM. The largest nesting location for the Kemp's ridley sea turtle is in Rancho Nuevo, Mexico, but they also nest in Texas and Alabama. Loggerhead sea turtles nest in all states around the Gulf of Mexico. Green sea turtles have been cited nesting in Texas, Alabama, and Florida. Leatherback sea turtles mostly nest on the east coast of Florida but are recorded in Texas. Kemp's ridley, loggerhead, and green sea turtles are therefore most likely to be affected by a catastrophic oil spill when there is onshore and/or offshore contact.

Several recent reports are available concerning Gulf of Mexico loggerheads' nesting habitats and movements (Hart et al., 2013); post-nesting behavior (Foley et al., 2013); foraging sites (Foley et al., 2014); and body size effects on growth rates (Bjorndal et al., 2013). These reports confirm the importance of Gulf of Mexico beaches, specifically for loggerheads. On September 22, 2011, NMFS issued the final rule to list 9 Distinct Population Segments (DPSs) of loggerhead sea turtles under the ESA and designated the GOM as the Northwest Atlantic Ocean DPS (*Federal Register*, 2011).

Female sea turtles seasonally emerge during the warmer summer months to nest on beaches. Thousands of sea turtles nest along the Gulf Coast, and turtles could build nests on oiled beaches. Nests could also be disturbed or destroyed by cleanup efforts. Untended booms could wash ashore and become a barrier to sea turtle adults and hatchlings (USDOC, NOAA, 2010c). Hatchlings, with a naturally high mortality rate, could traverse the beach through oiled sand and swim through oiled water to reach preferred habitats of *Sargassum* floats. Response efforts could include mass movement of eggs from hundreds of nests or thousands of hatchlings from Gulf Coast beaches to the east coast of Florida or to the open ocean to prevent hatchlings entering oiled waters (Jernelöv and Lindén, 1981; USDOI, FWS, 2010b). Due to poorly understood mechanisms that guide female sea turtles back to the beaches where they hatched, it is uncertain if relocated hatchlings would eventually return to the Gulf Coast to nest (Florida Fish and Wildlife Conservation Commission, 2010). Therefore, shoreline oiling and response efforts may affect future population levels and reproduction (USDOI, NPS, 2010). Sea turtle hatchling exposure to, fouling by, or consumption of tarballs persisting in the sea following the dispersal of an oil slick would likely be fatal.

As a preventative measure during the *Deepwater Horizon* explosion, oil spill, and response, NMFS and FWS translocated a number of sea turtle nests and eggs that were located on beaches affected or potentially affected by spilled oil. The NMFS stranding network website (USDOC, NMFS, 2014a) translocated a total of 275 nests from GOM beaches to the east coast of Florida. These nests were mainly for hatchlings that would enter waters off Alabama and Florida's northwest Gulf Coast. The translocation effort ended August 19, 2010, at the time when biologists determined that risks to hatchlings emerging from beaches and entering waters off Alabama and Florida's northwest Gulf Coast had diminished significantly and that the risks of translocating nests during late incubation to the east coast of Florida outweighed the risks of letting hatchlings emerge into the Gulf of Mexico. The hatchlings resulting from the translocations were all released as of September 9, 2010.

In addition to the impacts from direct contact with hydrocarbons, spill-response activities could adversely affect sea turtle habitat and cause displacement from suitable habitat to inadequate areas. Impacting factors might include artificial lighting from night operations, booms, machine and human activity, equipment on beaches and in intertidal areas, sand removal and cleaning, and changed beach landscape and composition. Some of the resulting impacts from cleanup could include interrupted or deterred nesting behavior, crushed nests, entanglement in booms, and increased mortality of hatchlings because of predation during the increased time required to reach the water (Newell, 1995; Lutcavage et al., 1997). The strategy for cleanup operations should vary, depending on the season.

Phase 4—Post-Spill, Long-Term Recovery and Response

Phase 4 focuses on long-term recovery once the well has been capped and the spill has stopped. During the final phase of a catastrophic blowout and spill, it is presumed that the well has been capped or killed and that cleanup activities are concluding. While it is assumed that the majority of spilled oil would be dissipated offshore within 1-2 months (depending on season and temperature) of stopping the flow, oil has the potential to persist in the environment long after a spill event and has been detected in sediment 30 years after a spill. On sandy beaches, oil can sink deep into the sediments. In tidal flats and salt marshes, oil may seep into the muddy bottoms. Potential impacts reflect long-term persistence of oil in the environment and residual and long-term cleanup efforts.

Sea turtles take many years to reach sexual maturity. Green sea turtles reach maturity between 20 and 50 years of age; loggerheads may be 35 years old before they are able to reproduce; and hawksbill sea turtles typically reach lengths of 27 in (69 cm) for males and 31 in (79 cm) for females before they can reproduce (USDOC, NMFS, 2010a). Declines in the food supply for sea turtles, which include invertebrates and sponge populations, could also affect sea turtle populations. While all of the pathways that an oil spill or the use of dispersants can affect sea turtles is poorly understood, some pathways may include the following: (1) oil or dispersants on the sea turtle's skin and body can cause skin irritation, chemical burns, and infections; (2) inhalation of volatile petroleum compounds or dispersants can damage the respiratory tract and lead to diseases; (3) ingesting oil or dispersants may cause injury to the gastrointestinal tract; and (4) chemicals that are inhaled or ingested may damage internal organs. In most foreseeable cases, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick would result in sublethal impacts (e.g., decreased health, reproductive fitness, and longevity and increased vulnerability to disease) to sea turtles. Other possible internal impacts might include harm to the liver, kidney, and brain function, as well as causing anemia and immune suppression, or they could lead to reproductive failure or death. The deaths of subadult and adult sea turtles may also drastically reduce the population.

Since January 1, 2011, a notable increase in sea turtle strandings has occurred in the northern GOM, primarily in Mississippi. While turtle strandings in this region typically increase in the spring, the recent increase is a cause for concern. The Sea Turtle Stranding and Salvage Network is monitoring and investigating this increase. The network encompasses the coastal areas of the 18 states from Maine through Texas and includes portions of the U.S. Caribbean. There are many possible reasons for the increase in strandings in the northern GOM, both natural and human caused (USDOC, NMFS, 2014a). One sea turtle had a small amount of tar from the *Deepwater Horizon* explosion, oil spill, and response on its shell. No visible external or internal oil was observed in any other animals. These sea turtle species include loggerhead, green, Kemp's ridley, leatherback, hawksbill, and unidentified. The NMFS has also identified strandings in Texas (upper Texas coast—Zone 18). Refer to **Chapter 4.1.1.12** for updated turtle stranding data for the Gulf of Mexico.

Overall Summary and Conclusion (Phases 1-4)

Accidental blowouts, oil spills, and spill-response activities resulting from the CPA proposed action have the potential to impact small to large numbers of sea turtles in the GOM, depending on the magnitude and frequency of accidents, the ability to respond to accidents, the location and date of accidents, and various meteorological and hydrological factors. Impacts on sea turtles from smaller accidental events are likely to affect individual sea turtles in the spill area, but they are unlikely to rise to the level of population effects (or significance) given the size and scope of such spills.

Unavailable information on the effects to sea turtles from the *Deepwater Horizon* explosion, oil spill, and response and increased stranding events (and thus changes to the sea turtle baseline in the affected environment) makes an understanding of the effects less clear.

For low-probability catastrophic spills, this analysis concludes that there is a potential for a low-probability catastrophic event to result in significant, population-level effects on affected sea turtle species.

B.3.1.14. Diamondback Terrapins

Phase1—Initial Event

Phase 1 of the scenario is the initiation of a catastrophic blowout event. Impacts, response, and intervention depend on the spatial location of the blowout and leak. For this analysis, an explosion and subsequent fire are assumed to occur. If a blowout associated with the drilling of a single exploratory well occurs, this could result in a fire that would burn for 1-2 days. If a blowout occurs on a production platform, other wells could feed the fire, allowing it to burn for over a month. The drilling rig or platform may sink. If the blowout occurs in shallow water, the sinking rig or platform may land in the immediate vicinity; if the blowout occurs in deep water, the rig or platform could land a great distance away, beyond avoidance zones. Regardless of water depth, the immediate response would be from search and rescue vessels and aircraft, such as USCG cutters, helicopters, and rescue planes, and firefighting vessels. Potential impacts reflect the explosion, subsequent fire for 1-30 days and the sinking of the platform in the immediate vicinity and up to 1 mi (1.6 km) from the well.

The scenarios for each phase, including cleanup methods, can be found in **Table B-4**.

There would likely be no adverse impacts to diamondback terrapins as a result of the events and the potential impact-producing factors that could occur throughout Phase 1 of a catastrophic spill event because these species exclusively inhabit estuarine waters and salt marshes.

Phase 2—Offshore Spill

Phase 2 of the analysis focuses on the spill and response in Federal and State offshore waters. A catastrophic spill would likely spread hundreds of square miles. Also, the oil slick may break into several smaller slicks, depending on local wind patterns that drive the surface currents in the spill area. Potential impacts reflect spill and response in Federal and State offshore waters. Season and temperature variations can result in different resource impacts due to variations in oil persistence and oil and dispersant toxicity and because of differences in potential exposure of the resources throughout various life cycle stages.

There would likely be no adverse impacts to diamondback terrapins as a result of the events and the potential impact-producing factors that could occur throughout Phase 2 of a catastrophic spill event because these species exclusively inhabit estuarine waters and salt marshes.

Phase 3—Onshore Contact

Phase 3 focuses on nearshore (e.g., inside bays and in close proximity to shoreline) and onshore spill response and on oil initially reaching the shoreline during the spill event or while the oil still persists in the offshore environment once the spillage has been stopped. It is likely that Phases 2 and 3 could occur simultaneously. The duration of the initial shoreline oiling is measured from initial shoreline contact until the well is capped or killed and the remaining oil dissipates offshore. The re-oiling of already cleaned or previously impacted areas could be expected during Phase 3. In addition to the response described in Phase 2, nearshore and onshore efforts would be introduced in Phase 3 as oil entered coastal areas and contacted shore. Potential impacts reflect the spill and response in very shallow coastal waters and once

along the shoreline. Season and temperature variations can result in different resource impacts due to variations in oil persistence and oil and dispersant toxicity and because of differences in the potential exposure of the resources throughout various life cycle stages.

The major impact-producing factors resulting from the low-probability catastrophic event at may affect the five terrapin subspecies that occur in the CPA include offshore and coastal oil spills and spill-response activities.

Terrapins inhabit brackish waters including coastal marshes, tidal flats, creeks, and lagoons behind barrier beaches (Hogan, 2003). Their diet consists of fish, snails, worms, clams, crabs, and marsh plants (Cagle, 1952). Courtship and mating occur in March and April, and the nesting season extends through July, with possibly multiple clutches (U.S. Dept. of the Army, COE, 2002; Butler et al., 2006). Terrapins nest on dunes, beaches, sandy edges of marshes, islands, and dike roads (Roosenburg, 1994). The common factor for proper egg development is sandy soil, which does not clog eggshell pores, thus allowing sufficient gas exchange between the developing embryo and the environment (Roosenburg, 1994). Nesting occurs primarily in the daytime during high tide on high sand dunes with gentle slopes and minimal vegetation (Burger, 1977). Clutch size ranges from 4 to 22 eggs, and incubation time ranges from 61 to 104 days (Butler et al., 2006; Burger, 1977). Female terrapins may nest 2-3 times in the same nesting season. Gender determination is temperature dependent. Hatching occurs from July through October in northeastern Florida (Butler et al., 2004).

Spending most of their lives at the aquatic-terrestrial boundary in estuaries, terrapins are susceptible to habitat destruction from oil-spill cleanup efforts as well as direct contact with oil. However, most impacts cannot be quantified at this time. Even after oil is no longer visible, terrapins may still be exposed while they forage in the salt marshes lining the edges of estuaries, where oil may have accumulated under the sediments and within the food chain. Terrapin nests can also be disturbed or destroyed by cleanup efforts. The range of the possible chronic effects from contact with oil and dispersants include lethal or sublethal oil-related injuries that may include skin irritation from the oil or dispersants, respiratory problems from the inhalation of volatile petroleum compounds or dispersants, gastrointestinal problems caused by the ingestion of oil or dispersants, and damage to other organs because of the ingestion or inhalation of these chemicals.

Accidental blowouts, oil spills, and spill-response activities resulting from the CPA proposed action have the potential to impact small to large numbers of terrapins within their habitat, depending on the magnitude and frequency of accidents, the ability to respond to accidents, the location and date of accidents, and various meteorological and hydrological factors. Populations of terrapins in the Gulf may be exposed to residuals of oils spilled as a result of the CPA proposed action during their lifetimes. Chronic or acute exposure may result in the harassment, harm, or mortality to terrapins occurring in the GOM. In the most likely scenarios, exposure to hydrocarbons persisting within the wetlands following the dispersal of an oil slick could result in sublethal impacts (e.g., decreased health, reproductive fitness, and longevity; and increased vulnerability to disease). Terrapin hatchling exposure to, fouling by, or consumption of tarballs persisting inland following the dispersal of an oil slick could likely be fatal but unlikely. Impacts from the dispersants are unknown, but they may have similar irritants to tissues and sensitive membranes as are known to occur in seabirds and sea turtles (NRC, 2005). The impacts to diamondback terrapins from chemical dispersants could include nonlethal injury (e.g., tissue irritation and inhalation), long-term exposure through bioaccumulation, and potential shifts in distribution from some habitats.

Burger (1994) described the behavior of 11 female diamondback terrapins that were oiled during the January 1990 spill of No. 2 fuel oil in Arthur Kill, New York. The terrapins were hibernating at the time of the spill, and when they emerged from hibernation, they were found to be oiled. The terrapins voided oil from their digestive tracks for 2 weeks in rehabilitation. At 3 weeks, the terrapins scored low on strength tests and were slow to right themselves when placed on their backs. At 4 weeks, they developed edema and appetite suppression. Eight of the 11 died; these animals had traces of oil in their tissues and exhibited lesions in their digestive tract consistent with oil exposure (Burger, 1994). Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

The *Deepwater Horizon* explosion, oil spill, and response may have potentially impacted the terrapin community. Impacts from a catastrophic spill may impact terrapin communities. Impacts can be either direct (mortality or injury) or indirect (e.g., reduced prey availability); however, most impacts cannot be quantified at this time. The best available information does not provide a complete understanding of the effects of the spilled oil and active response/cleanup activities on the potentially affected terrapin

environment. Current available information includes photographic evidence of one terrapin found oiled on Grand Terre Island, Louisiana, on June 8, 2010 (State of Louisiana, Coastal Protection and Restoration, 2012).

Phase 4—Post-Spill, Long-Term Recovery and Response

Phase 4 focuses on long term recovery once the well has been capped and the spill has stopped. During the final phase of a catastrophic blowout and spill, it is presumed that the well has been capped or killed and cleanup activities are concluding. While it is assumed that the majority of spilled oil would be dissipated offshore within 1-2 months (depending on season and temperature) of stopping the flow, oil has the potential to persist in the environment long after a spill event and has been detected in sediment 30 years after a spill. On sandy beaches, oil can sink deep into the sediments. In tidal flats and salt marshes, oil may seep into the muddy bottoms. Potential impacts reflect long term persistence of oil in the environment and residual and long-term cleanup efforts.

The *Deepwater Horizon* explosion, oil spill, and response and associated oil spill may have impacted the terrapin community and associated brackish habitats. According to OSAT-2 (2011a), possible environmental effects from the *Deepwater Horizon* explosion, oil spill, and response could occur within terrapin marsh habitat via food or to nesting habitat since no active intervention (natural remediation) is the preferred protocol.

Behavioral effects and nonfatal exposure to or intake of OCS oil- and gas-related contaminants or discarded debris may stress and/or weaken individuals of a local group or population and predispose them to infection from natural or anthropogenic sources. Even after the oil is no longer visible, terrapins may still be exposed while they forage in the salt marshes lining the edges of estuaries where oil may have accumulated under the sediments and within the food chain (Burger, 1994; Roosenburg et al., 1999). Nests can also be disturbed or destroyed by cleanup efforts. Through NRDA, ongoing research and analysis of the presence of contaminants in terrapin eggs following the *Deepwater Horizon* oil spill is being conducted (USDOC, NOAA, 2012a). Hatching success studies at various oiled nesting sites of the northern diamondback terrapin suggest that spills may result in a reduction in nest size and increased mortality of spring emergers (hatched turtles) at the oiled sites (Wood and Hales, 2001). However, research on the PAH exposure and toxicology of eggs in the vicinity of a spill site found no correlation to substrate PAHs when compared with egg toxicology. The level of PAHs found in the eggs may be the result of maternal transfer and represent the exposure level of the nesting female rather than environmental exposure to PAHs from oil at the site of the nest (Holliday et al., 2008).

Habitat destruction, road construction, drowning in crab traps, and nest predation are the most recent threats to diamondback terrapins. Tropical storms, hurricanes, and beach erosion threaten their preferred nesting habitats. Destruction of the remaining habitat because of a catastrophic spill and response efforts could drastically affect future population levels and reproduction.

Overall Summary and Conclusion (Phases 1-4)

Impacts on diamondback terrapins from smaller accidental events are likely to affect individual diamondback terrapins in the spill area, as described above, but are unlikely to rise to the level of population effects (or significance) given the probable size and scope of such spills. Possible catastrophic environmental effects from an oil spill and cleanup could occur within terrapin marsh habitat via food or to the nesting habitat. Since terrapins do not move far from where they are hatched, it is possible that entire subpopulations could incur high mortality rates and community disruptions, though this would be highly localized depending on the time, place, and size of the spill.

The OSRA analyses in this Supplemental EIS conclude that there is a low probability for catastrophic spills and that there is a potential for a low-probability catastrophic event to result in significant, population-level effects on affected diamondback terrapin species.

For those terrapin populations that may not have been impacted by the *Deepwater Horizon* explosion, oil spill, and response, it is unlikely that a future accidental event related to the CPA proposed action would result in significant impacts due to the distance of most terrapin habitat from offshore OCS energy-related activities.

B.3.1.15. Beach Mice

Phase 1—Initial Event

There would likely be no adverse impacts to beach mice as a result of the events and the potential impact-producing factors that could occur throughout Phase 1 of a catastrophic spill event because Phase 1 is the initiation of a catastrophic blowout incident, and initiation would occur well offshore from beach mouse habitat.

Phase 2—Offshore Spill

There would likely be no adverse impacts to beach mice as a result of the events and the potential impact-producing factors that could occur throughout Phase 2 of a catastrophic spill event because Phase 2 of the analysis focuses on the spill and response in Federal and State offshore waters away from beach mouse habitat.

Phase 3—Onshore Contact

Five subspecies of the field mouse, collectively known as beach mice, live along the Gulf Coast, and two beach mouse subspecies live on the Atlantic Coast of Florida. Five subspecies of beach mice (Alabama, Perdido Key, Choctawhatchee, St. Andrew, and Anastasia Island) are listed as State and federally endangered; also, the southeastern beach mouse is listed as federally threatened. Beach mice are restricted to the coastal barrier sand dunes along the Gulf Coasts of Alabama and Florida. Erosion caused by the loss of vegetation because of oiling would likely cause more damage than the direct oiling of beach mice because of the degradation or loss of habitat. In addition, vehicular traffic and activity associated with cleanup can trample or bury beach mice nests and burrows or cause displacement from preferred habitat. Improperly trained personnel and vehicle and foot traffic during shoreline cleanup of a catastrophic spill would disturb beach mouse populations and would degrade or destroy habitat.

The Alabama, Choctawhatchee, St. Andrew, Perdido Key, Anastasia Island, and southeastern beach mice are designated as protected species under the Endangered Species Act, mostly because of the loss and fragmentation of coastal habitat (*Federal Register*, 1989; USDOI, MMS, 2007). Some of the subspecies have coastal habitat that is designated as their critical habitat. For example, the endangered Alabama beach mouse's (*Peromyscus polionotus ammobates*) designated critical habitat is 1,211 acres (450 hectares) of frontal dunes covering just 10 mi (16 km) of shoreline (USDOI, FWS, 2007). Critical habitat is the specific geographic areas that are essential for the conservation of a threatened or endangered species.

All designated critical habitat for beach mice officially extends landward from the mean high water line (*Federal Register*, 2006; USDOI, FWS, 2007). Therefore, spilled oil could contact critical habitat even without a concurrent storm surge; contact would require only that the water level would be at mean high tide. However, a concurrent storm surge of considerable height would be required to oil the portion of the critical habitat substantially landward of the mean high water line (over the tops of the primary, secondary, and tertial dunes). With the potential oiling of over 1,000 mi (1,609 km) of shoreline that could result from a catastrophic spill event and a concurrent storm surge of considerable height that occurs within a close proximity to the critical habitat, there is the potential for the entire critical habitat for a subspecies of beach mice to be completely oiled. Thus, destruction of critical habitat because of a catastrophic spill, a concurrent storm surge of considerable height and over a considerable length of shoreline, and cleanup activities would increase the threat of extinction of several subspecies of beach mice. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

Phase 4—Post-Spill, Long-Term Recovery and Response

Within the last 20-30 years, the combination of habitat loss because of beachfront development, the isolation of the remaining beach mouse habitat areas and populations, and the destruction of the remaining habitat by tropical storms and hurricanes has increased the threat of extinction of several subspecies of beach mice. On sandy beaches, oil can sink deep into the sediments and become exposed again after erosion of sand by wave action. Oil may therefore persist near beach mouse habitat for the

long term. The destruction of the remaining habitat because of a catastrophic spill and cleanup activities would increase the threat of extinction.

Overall Summary and Conclusion (Phases 1-4)

Impacts to beach mice would vary according to the severity of the oiling. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

B.3.1.16. Coastal, Marine, and Migratory Birds

Phase 1—Initial Event

Some migratory birds use offshore platforms or rigs as stopover sites during their long-distance migrations across the GOM during the spring and fall (Russell, 2005). In addition, it has been well documented that seabirds are attracted to offshore platforms and rigs for a myriad of reasons; e.g., concentrations of baitfish, roost sites, etc. (Tasker et al., 1986; Wiese et al., 2001; Burke et al., 2012). The numbers of birds present at a platform or rig tend to be greater on platforms or rigs closer to shore, particularly during drilling operations (Baird, 1990). Birds resting on the drilling rig or platform during a catastrophic blowout at the surface (similar to the *Deepwater Horizon* explosion, oil spill, and response) are more likely to be killed by the explosion. While it is assumed that most birds in trans-Gulf migration would likely avoid the fire and smoke plume during the day, it is possible that the light from the fire could interfere with nocturnal migration, especially during poor visibility conditions, i.e., fog or low clouds. It has been documented that seabirds are attracted to natural gas flares at rigs and platforms (Russell, 2005; Wiese et al., 2001); therefore, additional bird fatalities could result from the fire following the blowout. Though different species migrate differentially throughout the year, the largest number of species migrates through the proposed area from mid-April through mid-May (spring migration back north) and from mid-August through early November (fall migration south) (Russell, 2005, Table 6.12; Farnsworth and Russell, 2007). A blowout during this time would potentially result in a greater number of bird fatalities (see below).

Of the four phases considered herein, avian mortality associated with this Phase is certainly expected to be much lower than avian mortality associated with either Phase 2 or Phase 3. However, this anticipated result is highly dependent on the location of the platform and the timing of the event. The only scenario considered is the case where a blowout and explosion occurred at the surface (**Table B-4**). If the catastrophic event, in this case a blowout and explosion at the surface (refer to **Table B-4**), occurs more proximal to the coast during the breeding season or during a peak migration period (late March to late May and mid-August to early November), then the level of avian mortality is expected to be higher. In comparison, a blowout and explosion at the surface on a platform more distant from the coast (greater than or equal to the distance of the *Macondo* well from the coast) would result in much lower avian mortality, particularly if the event did not overlap temporally with either the breeding season or either of the trans-Gulf migrations.

While the species composition and species-specific mortality estimates are unknown and would be dependent on the blowout location and time of year, the initial mortalities would almost certainly not result in population-level impacts for species present at the time of the blowout and resulting fire (Arnold and Zink, 2011; also refer to Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS). If the event occurred during the breeding season or wintering period, species of seabirds or diving birds would have the greatest potential to be affected, whereas if the event occurred during either the spring or fall migration, species of passerines would most likely have the greatest potential to be affected due to the diversity and sheer numbers of individuals in this avian species group (Rappole and Ramos, 1994; Lincoln et al., 1998; Russell, 2005; also refer to **Chapters 4.1.1.16 and 4.2.1.16** of this Supplemental EIS, Chapter 4.2.1.16.1 of the 2012-2017 WPA/CPA Multisale EIS, Chapter 4.2.1.16 of the WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.16 of the CPA 235/241/247 Supplemental EIS).

Phase 2—Offshore Spill

During Phase 2 of a catastrophic spill, the primary concern for marine and migratory birds would be their vulnerability to oiling or ingesting oil, which is primarily a function of their behavior and diets. Wading birds (e.g., herons, egrets, etc.) and species that feed by plunge-diving into the water to catch

small fish (e.g., pelicans, gannets, terns, gulls, and pelagic birds) and those that use water as a primary means of locomotion, foraging (e.g., black skimmers), or resting and preening (e.g., diving ducks, cormorants, pelicans, etc.) are highly vulnerable to becoming oiled and also to ingesting oil (**Table B-5** of this Supplemental EIS; also refer to Table 4-13 and Figure 4-13 of the 2012-2017 WPA/CPA Multisale EIS). Seabirds, in particular, tend to feed and concentrate in convergence zones, eddies, upwellings, and near *Sargassum* mats (Haney, 1986a-c; Moser and Lee, 2012). In addition to concentrating prey, these areas are also known to aggregate oil (Unified Incident Command, 2010d). Oiling interferes with the birds' ability to fly (and thus to obtain food) and compromises the insulative characteristics of down and contour feathers, making it difficult to regulate body temperature. Attempts by oiled birds to remove the oil via preening can cause them to ingest oil and may result in mortality. In addition, the ingestion of contaminated prey can result in physiological impairment and even death. Refer to Chapter 4.2.1.16.3 of the 2012-2017 WPA/CPA Multisale EIS for additional detailed information on oiling effects to birds.

Though several species or species groups are mentioned above, the most vulnerable species to spilled oil in the offshore environment in the GOM during Phase 2 would be representatives of the diving bird (≤10 species) and seabird (≥20 species) groups (King and Sanger, 1979; Ribic et al., 1997; Davis et al., 2000). It is highly probable that representative species of diving birds and seabirds would be differentially impacted (**Table B-5** of this Supplemental EIS; also refer to Table 4-12 of the 2012-2017 WPA/CPA Multisale EIS). Table 4-12 of the 2012-2017 WPA/CPA Multisale EIS shows the actual number of birds identified to the species level for each of the species groups collected after the *Deepwater Horizon* explosion, oil spill, and response. This number is fairly representative of the suite of species available to be oiled. Search effort likely declined dramatically once the *Macondo* well was plugged/capped. The species composition and species-specific mortality estimates associated with a Phase 2 catastrophic event are unknown and would be dependent primarily on the blowout location, as well as the distribution, coverage, and proximity to the shoreline of spilled oil. Overall, avian mortalities for this Phase would probably not result in population-level impacts for species present at the time of the blowout (refer to **Table B-5** of this Supplemental EIS and to Figure 4-13 of the 2012-2017 WPA/CPA Multisale EIS). However, it should be clear that many species of seabirds and diving birds have life-history strategies that do not allow subpopulations to recover quickly from major mortality events or perturbations (Ricklefs, 1983 and 1990; Russell, 1999; Saether et al., 2004; also refer to Table 4-13 and Figure 4-18 of the 2012-2017 WPA/CPA Multisale EIS).

Some discussion of available information provided from the *Deepwater Horizon* explosion, oil spill, and response is relevant here with respect to temporal aspects of oiled birds (**Figure B-3**). The first oiled bird (northern gannet, a seabird) recovered after the *Macondo* well event was collected just 10 days post-blowout. While gannets breed in coastal colonies in the Canadian North Atlantic, the population, including a major concentration in the northern GOM, over-winters in the deeper waters of the offshore environment. Belanger et al. (2010) provided some interesting results relative to live versus dead birds collected based on the actual date each bird was collected. Interestingly, they documented a dramatic and statistically significant decline in the number of live birds collected after 110 days compared with live birds collected during the first 72 days. These authors also documented a dramatic and statistically significant increase in the number of dead birds collected after 110 days (Belanger et al., 2010, Figures 2 and 3). As a temporal reference, oil reached the shoreline near Venice, Louisiana, ≥10 days post-blowout, covering a distance of approximately 90 mi (145 km) (Oil Spill Commission, 2011; also refer to Chapter 4.2.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS and Chapter 4.2.1.3 of the WPA 233/CPA 231 Supplemental EIS) (**Figure B-3**). It should be understood that, for the Phase 2 scenario considered here, it is assumed that spilled oil will not contact the shoreline.

Overall, avian mortality estimates are unknown and are difficult to predict given the uncertainty (Conroy et al., 2011, pages 1209-1210; Williams, 2011, page 1348) associated with the scenario and specific characteristics associated with the spill (refer to Appendix C of the WPA 238/246/248 Supplemental EIS), as well as environmental conditions that are probably a function of spill location and timing. Even recognizing the uncertainty associated with the scenario, spill characteristics, and the environmental conditions at the time of the spill, Phase 2 would likely be second only to Phase 3 in total avian mortality. Phase 3 would include much greater avian species diversity and abundance due to the oil reaching nearshore, coastal beach/dune, salt- and brackish marsh habitats (**Table B-5** of this Supplemental EIS; also refer to Table 4-12 of the 2012-2017 WPA/CPA Multisale EIS).

Phase 3—Onshore Contact

Gulf coastal habitats are essential to the annual cycles of many species of breeding, wintering, and migrating diving birds, seabirds, shorebirds, passerines, marsh- and wading birds, and waterfowl (refer to **Chapters 4.1.1.16 and 4.2.1.16** of this Supplemental EIS, Chapter 4.2.1.16.1 of the 2012-2017 WPA/CPA Multisale EIS, Chapter 4.2.1.16 of the WPA 233/CPA 231 Supplemental EIS, and Chapter 4.1.1.16 of the CPA 235/241/247 Supplemental EIS). For example, the northern Gulf Coast supports a large proportion of populations of several beach-nesting bird species (USDOI, FWS, 2010c). During Phase 3, oil is expected to contact not only the beach but also other important habitats used by a diverse and abundant assemblage of avian species. Habitats potentially impacted by a catastrophic spill would also likely include the nearshore environment, as well as the salt- and brackish marsh habitats. Potential impacts and total avian mortality from Phase 3 would be greater than any of the other phases considered herein due to (1) avian diversity and abundance in the nearshore environment (**Table B-5** of this Supplemental EIS; also refer to Tables 4-9 through 4-11 of the 2012-2017 WPA/CPA Multisale EIS) and (2) the dispersion of oil from a catastrophic spill, which would reach the shoreline and enter the salt- and brackish marsh environments. Similar to Phases 1 and 2, the timing and location of the spill are important factors in determining the severity of impacts to the avian community. In addition, the duration of potential oil exposure to various species of birds would also be important.

Figure 4-13 of the 2012-2017 WPA/CPA Multisale EIS should provide reasonable estimates of oiling rates for the seven avian species groups in the northern Gulf of Mexico if another catastrophic spill were to occur and the timing, oil spill characteristics, and spill behavior were similar to the *Deepwater Horizon* explosion, oil spill, and response. It should be noted that the top five most impacted (based on number collected) avian species from the *Deepwater Horizon* explosion, oil spill, and response were all representatives of the seabird group: laughing gull (n = 2,981, 40% oiling rate); brown pelican (n = 826, 41% oiling rate); northern gannet (n = 475, 63% oiling rate); royal tern (n = 289, 52% oiling rate); and black skimmer (n = 253, 22% oiling rate) (**Table B-5** of this Supplemental EIS and Figure 4-13 of the 2012-2017 WPA/CPA Multisale EIS).

Additional information is provided from an OSRA catastrophic oil-spill analysis (refer to Appendix C of the CPA 235/241/247 Supplemental EIS, Tables C-4 and C-5).

It should be noted that oil from the *Deepwater Horizon* explosion and oil spill reached the shoreline less than 14 days after the blowout occurred (Oil Spill Commission, 2011). The OSRA does not take into account or consider the following with respect to avian resources and their habitats: (1) species-specific densities; (2) species-specific habitat preferences, food habits, or behavior; (3) relative vulnerabilities to oiling among the avian species groups or among species within each of the groups (**Table B-5** of this Supplemental EIS and Figure 4-13 of the 2012-2017 WPA/CPA Multisale EIS; also refer to Williams et al., 1995; Camphuysen, 2006); and (4) species-specific life-history strategies, their demography, or a species' recovery potential (refer to Table 4-13 and Figures 4-18 and 4-19 of the 2012-2017 WPA/CPA Multisale EIS).

In summary, Phase 3 of a catastrophic oil spill has the greatest potential for negative impacts (e.g.., direct mortality) to avian resources due to its contact with the shoreline and inundation of other habitats occupied by a much greater diversity and abundance of birds, particularly during the breeding season. Avian mortality estimates are presently unknown and are difficult to predict with any level of precision given the uncertainty associated with the scenario, specific characteristics associated with the spill, spatial and temporal variation in environmental conditions, and recognition that the avian resources (both species diversity and abundance) available to be oiled will also vary temporally and spatially. A worst-case scenario in the event of a catastrophic oil spill that reached the nearshore environment would occur in the presence of a hurricane with strength or magnitude similar to Hurricanes Katrina, Rita, or Ike during the breeding season. Such an overlap of two low-probability events during the breeding season could potentially push spilled oil even farther inland and also distribute oil vertically into the vegetation. Such an event would not only negatively impact diving birds, seabirds, shorebirds, marsh- and wading birds, and waterfowl, but also the more terrestrial avian species groups including passerines and raptors. Such effects would most likely be long-term (due to direct mortality of individuals, but also due to major habitat loss) and could potentially result in population-level impacts to a number of avian species. Threatened and endangered avian species would likely be the most severely impacted by such an event, depending on the spatial and temporal aspects of both the spill and the hurricane.

Endangered and Threatened Birds

A detailed discussion of threatened and endangered species is provided for the CPA in Chapter 4.2.1.16.1 of the 2012-2017 WPA/CPA Multisale EIS. Of the 17 species considered, 11 species are known to occur in the CPA (**Table B-6**). However, only the piping plover (*Charadrius melodus*), roseate tern (*Sterna dougallii dougallii*), wood stork (*Mycteria americana*), whooping crane (*Grus americana*), Mississippi sandhill crane (*Grus canadensis pulla*), bald eagle (*Haliaeetus leucocephalus*), eastern brown pelican (*Pelecanus occidentalis*), and red knot (*Calidris canutus rufa*) were analyzed and are considered further here. The bald eagle and brown pelican were delisted. Phase 3 would likely result in the greatest net negative impacts (primarily direct mortality) to threatened and endangered avian species due to contact with the shoreline and potential movement of spilled oil inland to other habitats during this phase (**Table B-4**). In addition, the presence of spilled oil would result in indirect and potentially long-term effects to threatened and endangered avian species' habitats and their preferred foods. Phases 1 and 2 would likely result in very limited impacts, if any, due to the scenarios as defined with oil restricted to the offshore environment.

In general, the potential direct impact (i.e., mortality) to any or all of these threatened or endangered (including recently delisted and candidate) species is directly a function of their presence at the time of a catastrophic oil spill. Indirect effects from a catastrophic oil spill could negatively affect the quality and functional availability of their habitats and the availability, distribution, and energetic benefits of their preferred foods in the absence of a given species. Of the species listed, the wood stork, Mississippi sandhill crane, bald eagle, eastern brown pelican, and Cape Sable seaside sparrows are year-round residents, whereas the piping plover, roseate tern, whooping crane, and red knot represent either wintering species or transients that utilize coastal habitats in the GOM as staging areas during migration. Part of the brown pelican population is migratory. There are "resident" whooping cranes considered as "nonessential, experimental flocks" within the Gulf Coast States of Alabama, Louisiana, Mississippi, and Florida. These birds would be considered as "resident," whereas the component of the ESA-listed species occurring primarily as a wintering flock in Texas (i.e., the Aransas National Wildlife Refuge) is considered a migratory flock. It is important to recognize these differences relative to whether or not individuals of a given species would be present and available to be oiled should a catastrophic oil spill event occur. Similarly, species-specific differences in habitat use and behavior would further separate which species would be most vulnerable to a spill given the timing of the spill, spill distribution, and other spill-related characteristics.

Of the species considered, probably only the eastern brown pelican and possibly the bald eagle (ingestion of contaminated fish and birds) would potentially be impacted during Phases 1 and 2. The other species are restricted to the nearshore, coastal, salt- and brackish, and upland habitats, which would not be impacted during these phases given the scenario (**Table B-4**). Phase 4 impacts to threatened and endangered avian species would probably be limited to short-term disturbance-related effects and potential impacts to habitats including destruction, alteration, or fragmentation from associated recovery activities (American Bird Conservancy, 2010; National Audubon Society, Inc., 2010).

As the *Macondo* well blowout and spill is the only historic catastrophic oil spill to occur in U.S. waters in the GOM, the information obtained from the *Deepwater Horizon* explosion, oil spill, and response relative to avian mortality may be reasonably relevant for any future catastrophic spills, recognizing of course the variation and uncertainty associated with individual oil spills. Of the threatened and endangered avian species considered, only a single, unoiled piping plover was collected as part of the post-*Deepwater Horizon* explosion, oil spill, and response monitoring program (**Table B-5**). There were 106 least terns (*Sterna antillarum*) collected (n = 106, 46% oiling rate), but these individuals were considered as members of the coastal breeding population and not the ESA-listed population (Interior or noncoastal population). Of the species considered, only the eastern brown pelican was impacted by the *Deepwater Horizon* explosion, oil spill, and response (n = 826, 41% oiling rate); this species was delisted on November 17, 2009 (*Federal Register*, 2009). No other carcasses of threatened and endangered species were collected as part of the post-*Deepwater Horizon* explosion, oil spill, and response monitoring efforts (**Table B-5**; USDOI, FWS, 2011a).

Additional information is provided from an OSRA catastrophic oil-spill analysis (refer to Appendix C of the CPA 235/241/247 Supplemental EIS, Tables C-4 and C-5).

Caveats regarding the OSRA catastrophic run with respect to avian resources were addressed above and would also apply to threatened and endangered avian resources considered here.

Phase 4—Post-Spill, Long-Term Recovery and Response

There is a high probability of underestimating the impacts of oil spills on avian species potentially encountering oil. Despite being oiled, some birds are capable of flight and may later succumb to the oiling for a myriad of reasons (refer to Chapter 4.2.1.14 of the 2012-2017 WPA/CPA Multisale EIS for additional detailed information). Often overlooked and understudied are the long-term, sublethal, chronic effects due to sublethal exposure to oil (Butler et al., 1988; Alonso-Alvarez et al., 2007; Pérez et al., 2010). Also, individuals having been oiled in the Gulf of Mexico as the result of a catastrophic oil spill during the overwinter period or while staging in the GOM could exhibit carry-over effects to the northern breeding grounds. Affected individuals in poor body condition may arrive at their breeding grounds later than nonaffected individuals, which could, in turn, negatively affect habitat-use decisions, territory establishment, pairing success, and ultimately lead to reduced reproductive success (Norris, 2005; Norris et al., 2006; Harrison et al., 2011). Some oiled individuals may forego breeding altogether (Zabala et al., 2010). If oil-affected, long-distance migrants represent important prey items for various species of raptors, then the ingestion of affected individuals could also negatively affect individual birds of prey (Zuberogoitia et al., 2006). The effects from disturbance due to oil-spill cleanup from the *Deepwater Horizon* explosion were only observed at sites with high cleanup activity, suggesting that the impact of oil-spill cleanup on shorebirds may be minimized by limiting cleanup activities to specific areas and times of day (Henkel et al., 2014). The types of disturbance analyzed included mechanical cleanup, nonmechanical cleanup, and people walking, sometimes with dogs (Henkel et al., 2014). The long-term impacts of potential food-induced stress for bird species from an altered ecosystem due to a catastrophic spill are unknown, but disturbances to the ecosystem can cause long-term sublethal impacts, including reduced food intake, prey switching, increased energy expenditures, decreased reproductive success, and decreased survival. Decreases in either reproductive success or survival (or both) could result in population-level effects, as was observed for certain avian species more than 10 years after the *Exxon Valdez* catastrophic spill (Esler et al., 2002 and 2010; Golet et al., 2002). Long-term, sublethal, chronic effects may exceed immediate losses (i.e., direct mortality of oiled birds) if residual effects influence a significant proportion of the population or disproportionately impact an important aspect of the population demographic, e.g.., breeding-age females (Croxall and Rothery, 1991; Oro et al., 2004). Depending on the effects and the life-history strategy of impacted species, some populations could take years or decades before reaching pre-spill population numbers and age-sex structure; some populations for some species may never recover (refer to Figure 4-13 of the 2012-2017 WPA/CPA Multisale EIS; refer to Peterson et al., 2003, but also to Wiens et al., 2010).

In general, potential effects associated with Phase 4 should be limited to short-term disturbance effects (personnel and equipment) and potential indirect effects to various avian species groups due to habitat loss, alteration, or fragmentation from restoration efforts. There may be cases whereby incubating individuals are flushed from nests exposing their eggs or young to either weather-related mortality or depredation by avian or mammalian predators (American Bird Conservancy, 2010; National Audubon Society, Inc., 2010). However, efforts to minimize potential effects of post-oil spill monitoring and restoration efforts, particularly during the breeding season, should be sufficient to protect nesting birds as a function of oversight by Federal and State agencies charged with the conservation of migratory bird resources.

Overall, the *Deepwater Horizon* explosion, oil spill, and response appears to have directly resulted in far fewer dead, oiled birds than the *Exxon Valdez* catastrophic spill. Total seabird mortality from the *Deepwater Horizon* explosion, oil spill, and response is useful knowledge because it gives an indication of the baseline shift in population sizes. Total seabird mortality (not a per annum estimate but instead accounting for all bird deaths) seaward of 40 km (25 mi) from shore due to the *Deepwater Horizon* explosion, oil spill, and response was estimated at 200,000 birds (Haney et al., 2014a). Estimates of breeding population sizes were 60,000-15,000,000 for four procellariiforms; 9,000 for one pelecaniform; and 96,000-500,000 for three charadriiforms (Haney et al., 2014a). Total bird mortality (not a per annum estimate but instead accounting for all bird deaths) shoreward of 40 km (25 mi) from shore was estimated by two models, culminating in estimates of 600,000 birds using one model and 800,000 birds using the other (Haney et al., 2014b). In three analyzed species of seabirds, estimated losses due to the *Deepwater Horizon* explosion, oil spill, and response were 12 percent or more of the total population estimated present in the northern Gulf of Mexico (Haney et al., 2014b). This new information estimates a small negative shift in baseline numbers due to the calculated mortality of hundreds of thousands of Gulf of

Mexico seabirds after the *Deepwater Horizon* explosion, oil spill, and response. No data are available on any recovery since the analyses by Haney et al. (2014a and 2014b), but the initial negative shift was insufficient to cause a change in the expected impacts to seabirds from a catastrophic spill.

It should be recognized that the avian-related mortality associated with the *Deepwater Horizon* explosion, oil spill, and response (considered a catastrophic event) represents a small fraction of birds killed when compared with collisions with offshore oil and gas platforms. Russell (2005, page 304) states, "an average Gulf platform may cause 50 deaths by collision [only] per year," so using this number, the number of deaths the *Deepwater Horizon* rig would have caused through collisions had it remained intact for its 40-year term would be about 2,000. That is about 5,258 less than the number of avian carcasses collected due to the *Deepwater Horizon* explosion, oil spill, and response just given above. In the GOM, an estimated 200,000-321,000 avian deaths occur annually; primarily due to collisions with platforms (Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS; also refer to Russell, 2005). Over the life of the GOM platform archipelago, the estimated total avian mortality is on the order of 7-12 million birds (refer to Figure 4-15 of the 2012-2017 WPA/CPA Multisale EIS). Oil spills, regardless of size, are just one of a myriad of anthropogenic avian mortality sources. No Gulf of Mexico regional estimates are available for annual mortality rates for these sources. However, recent quantitative national estimates (Loss et al., 2013, 2014a, and 2014b) allow a qualitative but not quantitative extrapolation to the Gulf of Mexico. The national estimates include songbirds, and these are relevant because they may be impacted during trans-Gulf migration. To give perspective, an estimated range of national annual mortality from collision with vehicles is 62-275 million birds per year, national annual mortality from collision with buildings is estimated at 599 million birds per year, and annual mortality from predation by free-ranging domestic cats is estimated at 1.4-3.7 billion birds per year. These mortality estimates are nationwide, not just for the northern Gulf of Mexico; therefore, impacts would be much lower. Loss et al. (2014b) provide unprecedented state-of-the-art science (Machtans and Thogmartin, 2014) using species-specific local mortality estimates and an explicit treatment of known biases with acknowledged uncertainty in the final national estimate. These techniques allowed more reasonable extrapolation to total bird mortality on a national scale. The innovative estimates by Loss et al. (2014b) were compiled from many previously available local studies that were never designed to be used for extrapolation but were successfully used for that anyway (Machtans and Thogmartin, 2014).

Overall Summary and Conclusion (Phases 1-4)

While the species composition and species-specific mortality estimates are unknown and would be dependent on the blowout location and time of year, the mortalities for the initial event (Phase 1) would almost certainly not result in population-level impacts for species present at the time of the blowout and resulting fire. Seabirds are highly vulnerable to becoming oiled and also to ingesting oil during Phase 2 (the offshore spill). Even recognizing the uncertainty associated with the scenario, spill characteristics, and the environmental conditions at the time of the spill, Phase 2 would likely be second only to Phase 3 (onshore contact) in total avian mortality. Phase 3 would include greater impacts to avian species' richness and abundance (particularly during the breeding season) due to oil reaching habitats, including the nearshore, coastal beaches and dunes, and salt and brackish marshes. In general, the potential effects associated with Phase 4 (long-term recovery and response) should be limited to short-term disturbance effects (by cleanup personnel and equipment) and potential indirect effects to various bird species groups from habitat loss, alteration, or fragmentation from restoration efforts.

Phases 1 (initial event) and 2 (offshore spill) would likely result in very limited impacts to threatened and endangered bird species because the two scenarios have oil restricted to the offshore environment. Phase 3 (onshore contact) would likely result in the greatest net negative impacts to threatened and endangered bird species due to contact with the shoreline and potential movement of spilled oil inland to other habitats during this phase.

B.3.1.17. Fish Resources and Essential Fish Habitat

Phase 1—Initial Event

Depending on the type of blowout and the proximity of marine life to it (**Table B-1**), an eruption of gases and fluids may generate not only a toxic effect but also pressure waves and noise significant enough to injure or kill local biota. Within a few thousand meters of the blowout, resuspended sediments may

clog fish gills and interfere with respiration. Settlement of resuspended sediments may, in turn, smother invertebrates or interfere with their respiration. Essential fish habitat (EFH) in the vicinity of the blowout could have adverse effects from the event. These EFH resources are discussed in the water quality (**Chapter B.3.1.2**), live bottoms (**Chapter B.3.1.6**), topographic features (**Chapter B.3.1.7**), *Sargassum* communities (**Chapter B.3.1.8**), chemosynthetic and nonchemosynthetic deepwater benthic communities (**Chapters B.3.1.9 and B**.**3.1.10**, respectively), and soft bottom benthic communities (**Chapter B.3.1.11**) chapters.

Phase 2—Offshore Spill

With the initiation of a catastrophic blowout incident, an explosion and subsequent fire are assumed to occur. If a blowout associated with the drilling of a single exploratory well occurs, this could result in a fire that would burn for 1 or 2 days, but if a blowout occurs on a production platform and other wells feed the fire, it could burn for over a month. The drilling rig or platform may sink, and if this occurs in shallow water, the sinking rig or platform may land in the immediate vicinity. If the blowout occurs in deep water, the rig or platform could land a great distance away and could be beyond avoidance zones. Regardless of water depth, the immediate response would be from search and rescue vessels and aircraft, such as USCG cutters, helicopters, rescue planes, and firefighting vessels.

Early life stages of animals are usually more sensitive to oil than adults (Boesch and Rabalais, 1987; NRC, 2005). Weathered crude oil has been shown in laboratory experiments to cause malformation, genetic damage, and even mortality at low levels in fish embryos of Pacific herring (Carls et al., 1999). Because natural crude oil found in the Gulf of Mexico would generally float on the surface, fish species whose eggs and larvae are found at or near the water surface are most at risk from an offshore spill. Species whose spawning periods coincide with the timing of the highest oil concentrations would be at greatest risk.

Adult fish may be less at risk than earlier life stages, in part because they are less likely to concentrate at the surface and may avoid contact with floating oil. The effects of oil on organisms can include direct lethal toxicity, sublethal disruption of physiological processes (internal lesions), the effects from direct coating by oil (suffocation by coating gills), incorporation of hydrocarbons in organisms (tainting or accumulation in the food chain), and changes in biological habitat (decreased dissolved oxygen) (Moore and Dwyer, 1974). The extent of the impacts of the oil would depend on the properties of the oil and the time of year of the event.

If there is a subsea catastrophic blowout, it is assumed dispersants would be used. Then there could be effects on multiple life history stages and trophic levels. There is limited knowledge of the toxicity of dispersants mixed with oil to specific species or life stages of ichthyoplankton and the likely extent of mortality because the combination of factors is difficult to determine. The combined toxic effects of the oil and any dispersants that may be used would not be apparent unless a significant portion of a year-class is absent from next year's fishery (e.g., shrimps, crabs, snapper, and tuna). An example of a catastrophic event in the CPA was modeled using OSRA (Appendix C of the CPA 235/241/247 Supplemental EIS, Tables C-4 and C-5). Because fish occur throughout the GOM, it is assumed that some individuals would be contacted with oil. Specific habitats that are discussed with regards to the Central Planning Area OSRA examples and in the Appendix are water quality (**Chapter B.3.1.2**), wetlands (**Chapter B.3.1.4**), seagrass communities (**Chapter B.3.1.5**), live bottoms (**Chapter B.3.1.6**), topographic features (**Chapter B.3.1.7**), *Sargassum* communities (**Chapter B.3.1.8**), chemosynthetic and nonchemosynthetic deepwater communities (**Chapters B.3.1.9 and B.3.1.10**, respectively), and soft bottom benthic communities (**Chapter B.3.1.11**).

Studies by USEPA, Office of Research and Development (2010) using representative species provide some indication of the relative toxicity of Louisiana sweet crude oil, dispersants, and oil/dispersant mixes. Bioassays were conducted using two Gulf species—a mysid shrimp (*Amercamysis bahia*) and a small estuarine fish, the inland silverside (*Menidia beryllinina*)—to evaluate the acute toxic effects of oil, eight dispersants, and oil/dispersant mixtures. In addition, USEPA used standard *in vitro* techniques using the same dispersants to (1) evaluate the acute toxicity on three cell lines over a range of concentrations and (2) evaluate the effects of these dispersants on androgen and estrogen function using human cell lines (to see if they are likely to disrupt hormonal systems). All dispersants showed cytotoxicity in at least one cell type at concentrations between 10 and 110 ppm. Results of the *in vitro* toxicity tests were similar to the whole animal tests. For all eight dispersants, for both species, the dispersants alone were less toxic than

the dispersant/oil mixture. Louisiana sweet crude oil alone was determined to be more toxic to both the mysid shrimp and silverside fish than the dispersants alone. The results of the testing for disruption of androgen and estrogen function indicate that the dispersants do not show biologically significant endocrine activity via androgen or estrogen pathways (USEPA, Office of Research and Development, 2010).

The GOM waters out to 100 fathoms (182 m; 600 ft) have EFHs described and identified for managed species (GMFMC, 2005; USDOC, NOAA, 2009). There are Fisheries Management Plans for shrimp, red drum, reef fishes, coastal migratory pelagics, spiny lobsters, coral and coral reefs, and highly migratory species (GMFMC, 2004; USDOC, NOAA, 2009). These species could use the GOM for EFH at different life history stages. The Highly Migratory Species Fisheries Management Plan was recently amended to update EFH and Habitat Areas of Particular Concerns for the Atlantic bluefin tuna spawning area (USDOC, NOAA, 2009).

These EFHs in the Gulf of Mexico are discussed in various chapters of this Appendix: water column (**Chapter B.3.1.2**); wetlands (**Chapter B.3.1.4**); seagrass communities (**Chapter B.3.1.5**), live bottoms (**Chapter B.3.1.6**); topographic features (**Chapter B.3.1.7**), *Sargassum* communities (**Chapter B.3.1.8**); chemosynthetic and nonchemosynthetic deepwater benthic communities (**Chapters B.3.1.9 and B.3.1.10**, respectively), and soft bottom benthic communities (**Chapter B.3.1.11**); these EFHs are also summarized in Appendix D of the 2012-2017 WPA/CPA Multisale EIS. There are current NTLs (NTL 2009-G39 and NTL 2009-G40), stipulations, and mitigations that provide guidance and clarification of the regulations with respect to many of these biologically sensitive underwater features and areas and benthic communities, which are considered EFH.

Plankton

Open-water organisms, such as phytoplankton and zooplankton, are essential to the marine food web. They play an important role in regulating climate, contribute to marine snow, and are an important source of nutrients for mesopelagic and benthic habitats. Also, monthly ichthyoplankton collections over the years 2004-2006 offshore of Alabama have confirmed that peak seasons for ichthyoplankton concentrations on the shelf are spring and summer (Hernandez et al., 2010). If a catastrophic blowout occurs in the spring and summer, it could cause greater harm to fish populations and not just individual fish. Therefore, an offshore oil spill would not only have an impact on these populations but also on the species that depend on them.

The microbial community can also be affected by an offshore oil spill. The microbial loop is an essential part of the marine ecosystem. Changes in the microbial community because of an oil spill could have significant impacts on the rest of the marine ecosystem. However, several laboratory and field experiments and observations have shown that impacts to planktonic and marine microbial populations are generally short lived and do not affect all groups evenly, and in some cases stimulate growth of important species (Gonzalez et al., 2009; Graham et al., 2010; Hing et al., 2011).

Phase 3—Onshore Contact

It is estimated that shoreline oiling would last 1-5 months from a shallow-water catastrophic spill event and 3-4 months from a deepwater catastrophic spill. It is estimated that there would be contact to the shoreline within 30 days of the spill for both shallow-water and deepwater spill locations. Though response methods would be monitored, there would also be some impact from these efforts on contacted coastal habitats. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

The life history of estuarine-dependent species involves spawning on the continental shelf; the transportation of eggs, larvae, or juveniles back to the estuary nursery grounds; and migration of the adults back to the sea for spawning (Deegan, 1989; Beck et al., 2001). Estuaries in the Gulf of Mexico are extremely important nursery areas and are considered EFH for fish and other aquatic life (Beck et al., 2001). Oiling of these areas, depending on the severity, can destroy nutrient-rich marshes and erode coastlines that have been significantly damaged by recent hurricanes.

The Gulf of Mexico supports a wide variety of finfish, and most of the commercial finfish resources are linked either directly or indirectly to the estuaries that ring the Gulf of Mexico. Darnell et al. (1983) observed that the density distribution of fish resources in the Gulf was highest nearshore off of the central

Gulf Coast. For all seasons, the greatest abundance occurred between Galveston Bay and the mouth of the Mississippi River. Oyster beds could be damaged by freshwater diversions that release tens of thousands of cubic feet of freshwater per second for months in an effort to keep oil out of the marshes. Adult oysters survive well physiologically in salinities from those of estuarine waters (about 7.5 parts per thousand sustained) to full strength seawater (Davis, 1958). While oysters may tolerate small changes in salinity for a few weeks, a rapid decrease in salinity over months would kill oysters. In the event of a catastrophic oil spill, at least 1 year's oyster production in the area receiving fresh water would be lost because of exposure to freshwater and/or oil.

Phase 4—Post-Spill, Long-Term Recovery and Response

In addition to possible small fish kills because of direct impacts (as described under Phases 2 and 3), a catastrophic spill could affect fish populations in the long term. Due to a catastrophic spill, a significant portion of a year class of fish could be absent from the following year's fishery, reducing overall population numbers. However, sublethal impacts, especially for long-lived species (e.g., snapper and grouper), could be masked by reduced fishing pressure because of closures. In addition, healthy fish resources and fishery stocks depend on ideal habitat (EFH) for spawning, breeding, feeding, and growth to maturity. There could be long-term effects to coastal habitats from buried or sequestered oil becoming resuspended after a disturbance. Thus, a catastrophic spill that affects these areas could result in long-term impacts, including destruction to a portion of their natural habitats.

Overall Summary and Conclusion (Phases 1-4)

Depending on the type of blowout and the proximity of marine life to it, an eruption of gases and fluids may generate not only a toxic effect but also pressure waves and noise significant enough to injure or kill local biota and destroy habitat in the immediate vicinity (Phase 1). Adult fish may be less at risk than earlier life stages, in part because they are less likely to concentrate at the surface and may avoid contact with floating oil. Effects of oil on organisms can include direct lethal toxicity, sublethal disruption of physiological processes (internal lesions), the effects from direct coating by oil (suffocation by coating gills), incorporation of hydrocarbons in organisms (tainting or accumulation in the food chain), and changes in biological habitat (decreased dissolved oxygen) (Phase 2). Estuaries in the Gulf of Mexico are extremely important nursery areas and are considered EFH for fish and other aquatic life (Beck et al., 2001). Oiling of these areas, depending on the severity, can destroy nutrient-rich marshes and erode coastlines that have been significantly damaged by recent hurricanes (Phase 3). Due to a catastrophic spill, a significant portion of a year class of fish could be absent from the following year's fishery, reducing overall population numbers. However, sublethal impacts, especially for long-lived species (e.g., snapper and grouper), could be masked by reduced fishing pressure because of closures (Phase 4).

B.3.1.18. Commercial Fisheries

Phase 1—Initial Event

The initial explosion and fire could endanger commercial fishermen in the immediate vicinity of the blowout. Although commercial fishing vessels in the area would likely aid in initial search-and-rescue operations, the subsequent fire could burn for over a month, during which time commercial vessels would be expected to avoid the area so as to not interfere with response activities. This could impact the livelihood and income of these commercial fishermen. The extent of the economic impact on the fishing community would depend largely on the season during which the blowout occurred, the depth of water in which it occurred, and its distance from shore.

Phase 2—Offshore Spill

The Gulf of Mexico is one of the largest producers of seafood in the continental United States. In 2012, the Gulf of Mexico provided 38 percent of the commercial fishery landings in the continental U.S. (excluding Alaska), with over 1.7 billion pounds valued at $763 million (USDOC, NMFS, 2014b). Various commercial species are fished from State waters through the Exclusive Economic Zone and are

found throughout the water column as well as at the surface and near the seafloor. Commercial species occupy many different habitats throughout the area, and many commercial species occupy different habitats during different life stages. Most commercial species spend at least part of their life cycles in the productive shelf and estuarine habitat. In the event of a catastrophic offshore spill, it is assumed that a large quantity of oil would be released daily whether this spill occurred in State or Federal waters. Although the oil would generally float, it is also assumed that dispersants would be used preventing much of the oil from reaching the surface.

As an example of the areas that could be affected by such a catastrophic oil spill in the CPA, OSRA model runs were performed using three different launch points as described in **Chapter B.1.2.3**. The resulting tables show conditional probabilities (expressed as percent chance) of an oil spill contacting resources in the GOM for each launch point and for each season, the condition being that a spill is assumed to have occurred at the given location. Because the commercial species are so widespread over the GOM, all of the tables are referenced (Appendix C of the CPA 235/241/247 Supplemental EIS, Tables C-4 and C-5).

Oil that is not volatilized, dispersed, or emulsified by dispersants has the potential to affect finfish through direct ingestion of hydrocarbons or ingestion of contaminated prey. Finfish are, however, mobile and generally avoid adverse conditions. Less mobile species or planktonic larval stages are more susceptible to the effects of oil and dispersants.

Actual effects of any oil that is released and comes in contact with populations of commercially important species will depend on the API gravity of the oil, its ability to be metabolized by microorganisms, and the time of year of the spill. The effects on the populations will be at a maximum during the spawning season of any commercially important population, exposing larvae and juveniles to oil. The effects on commercial species may also include tainting of flesh or the perception of tainting in the market. This can, depending on the extent and duration of the spill, affect marketability of commercial species.

Even though sensory testing may show no detectable oil or dispersant odors or flavors and the chemical test results could be well below the known levels of concern, NOAA Fisheries would be expected to close large portions of the Gulf of Mexico during a high-volume spill. This would be done as a precautionary measure to ensure public safety and to assure consumer confidence in Gulf seafood (USDOC, NMFS, 2010b). Up to 40 percent of the Gulf of Mexico's Exclusive Economic Zone could be closed to commercial fishing as the spill continues and expands (USDOC, NMFS, 2010c). This area could represent 50-75 percent of the Gulf's seafood production (Flynn, 2010). The size of the closure area may peak about 50 days into the spill and could persist another 2-3 months until the well is killed or capped and the remaining oil is recovered or dissipates. During this period, portions or all of individual State waters would also be closed to commercial fishing.

The economic impacts of closures on commercial fishing are difficult to predict because they are dependent on the season and would vary by fishery. If fishers cannot make up losses throughout the remainder of the season, a substantial part of their annual income would be lost. In some cases, commercial fishers will leave the industry and some may move to areas still open to fishing, but at a greater cost because of longer transit times. Marketing issues are also possible; even if the catch is uncontaminated, the public may lack confidence in the product. The duration of the public's perception of seafood tainting is also difficult to predict and depends to some extent on the duration of the spill and public awareness of the spill.

Phase 3—Onshore Contact

Shoreline contact of oil is estimated to persist from 1 to 5 months in the event of a shallow-water catastrophic spill and for up to 6 months from a deepwater catastrophic spill. The OSRA probability tables show the conditional probabilities (expressed as percent chance) for a shoreline contact for each season, the condition being that a spill is assumed to have occurred at the given location. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

This scenario, depending on the sea son of occurrence, would cause disruption in commercial fishing activity because many commercial fishermen operate inshore in State waters.

In addition to closures in Federal waters, portions of individual State waters would also be closed to commercial fishing. The economic impacts of closures on commercial fishing are complicated to predict because it is dependent on season and would vary by fishery. If fishers cannot make up losses in the

remainder of the season, a substantial part of their annual income will be lost. In some cases, commercial fishers may move to areas still open to fishing, but at a greater cost because of longer transit times and, in some instances, additional license costs. Some commercial fishermen may also augment their income by aiding in the cleanup effort and/or renting the boats as vessels of opportunity.

Phase 4—Post-Spill, Long-Term Recovery and Response

The Gulf of Mexico is an important biological and economic area in terms of commercial seafood production and recreational fishing. Commercial fishermen in the Gulf of Mexico harvested over 1.7 billion pounds of finfish and shellfish in 2012 (USDOC, NMFS, 2014b). The economic impacts of closures on commercial fishing are complicated to predict because the economic effects are dependent on season and would vary by fishery. If fishermen cannot make up losses by fishing the remainder of the season or by participating as contractors in the cleanup, a substantial part of their annual income could be lost and may force them out of the industry. While the commercial fishing industry of Texas did not sustain measurable direct or indirect economic effects following the 1979 *Ixtoc I* blowout and spill (Restrepo et al., 1982), there is a documented phenomenon that, long after an incident, the perception of tainted fish and shellfish from the impacted area persists (Keithly and Diop, 2001). Data regarding the duration of the negative perception of Gulf seafood following the *Deepwater Horizon* explosion, oil spill, and response are not yet available. It is reasonable to assume that a negative perception could impact the value of commercial fish resources for several seasons.

Overall Summary and Conclusion (Phases 1-4)

The Gulf of Mexico is one of the largest producers of seafood in the continental United States. Various commercial species are fished from State waters through the Exclusive Economic Zone and are found throughout the water column. The primary economic impacts of oil spill on commercial fisheries are the closure of State or Federal waters to fishing and the perception of seafood tainting by the market. Both of these factors are difficult to predict. Closures depend on the size, timing, depth of water, and location of the spill as well as the fishery involved. Perception depends on length of the spill and public perception. Both of these factors could affect the livelihood of the fishing community.

B.3.1.19. Recreational Fishing

Phase 1—Initial Phase

About 20 percent of the recreational fishing activity in the Gulf of Mexico occurs within 300 ft (91 m) of oil and gas structures (Hiett and Milon, 2002). Therefore, an explosion and fire could endanger recreational fishermen and divers in the immediate vicinity of the blowout, especially if the blowout is located close to shore. Recreational vessels in the area would likely aid in initial search-and-rescue operations but they would also be in danger during the explosion and subsequent fire. The subsequent fire could burn for up to a month, during which recreational vessels would be expected to avoid the area and to not interfere with response activities. It is also possible that recreational fishing could be impacted in areas beyond the immediate area of the event due to the perceptions of the public.

Phase 2—Offshore Spill

If a catastrophic spill were to occur, a substantial portion of ocean waters could be closed. For example, 88,522 square miles (mi^2) (229,271 square kilometers [km^2]) were closed to recreational fishing activity at the peak of the *Macondo* well oil spill. However, the majority of recreational fishing activity occurs fairly close to shore. Therefore, while the spill remains offshore, the impacts would be particularly felt with respect to fishing of offshore species such as king mackerel and red snapper (the impacts of a catastrophic spill on fish populations are discussed in **Chapter B.3.1.17**). The NOAA's Center for Coastal Monitoring and Assessment (USDOC, NOAA, Center for Coastal Monitoring and Assessment, 2012b) provides a set of maps that display the locations in the Gulf of Mexico where certain fish species are prevalent. However, even while the spill remains offshore, there could be impacts to inshore recreational fishing due to misperceptions regarding the extent of the spill or due to concerns regarding

the tainting of fish species. These misperceptions could also reduce tourism activity, which would impact tourism-based recreational fishing activity.

In 2011, the percent of each Gulf Coast State's recreational fishing activity that occurred in State and Federal ocean waters combined (i.e., not inland waters) were as follows: Texas (6%); Louisiana (5%); Mississippi (2%); Alabama (42%); and West Florida (34%) (USDOC, NMFS, 2012; Texas Parks and Wildlife Department, 2012). **Chapter 4.1.1.17** of this Supplemental EIS provides a further breakdown of recreational fishing activity by state. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

Phase 3—Onshore Contact

If a catastrophic spill were to reach shore, there would likely be noticeable impacts to recreational fishing activity. Since most recreational fishing activity occurs fairly close to shore, there would be a number of direct impacts to angler activity due to the fishing closures that would likely arise. This is particularly true since anglers would find it more difficult to find substitute fishing sites in the case of a catastrophic spill. In 2011, the percent of each Gulf State's recreational fishing activity that occurred inland were as follows: Texas (94%); Louisiana (95%); Mississippi (98%); Alabama (58%); and West Florida (66%) (USDOC, NMFS, 2012; Texas Parks and Wildlife Department, 2012). The impacts to recreational fishing would also depend on the time of year of the spill. In 2011, 31 percent of angler trips in the Gulf occurred between January and April, 41 percent of angler trips occurred between May and August, and 28 percent of angler trips occurred between September and December (USDOC, NMFS, 2012). In addition, fishing tournaments are often scheduled for the summer months and would be difficult to reschedule in the aftermath of a catastrophic spill. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

There would also be various economic impacts along the recreational fishing supply chain. Gentner Consulting Group (2010) estimates that recreational fishing activity supports $9.8 million in direct expenditures and $23 million in total sales per day in the Gulf of Mexico. There could be further impacts if the fishing closures persisted long enough to affect purchases of boats and other durable fishing equipment. There could also be further impacts if the loss of opportunities for recreational fishing activity exacerbated the fall in tourism activity that would arise due to the spill.

Phase 4—Post-Spill, Long-Term Recovery and Response

The long-term impacts of a catastrophic spill on recreational fishing activity would primarily depend on the extent to which fish populations recover (refer to **Chapter B.3.1.17** for more information). However, the longer term impacts of a spill on recreational fishing activity would also depend on the extent to which public perceptions of fish tainting can be assuaged. In addition, the longer-term impacts would depend on the extent to which the various firms that serve the recreational fishing industry would be able to weather the downturn in activity resulting from the spill.

Overall Summary and Conclusion (Phases 1-4)

Recreational fishing activity could be noticeably impacted in the event of a catastrophic spill. This is particularly the case if the spill reached shore or if the spill occurred during peak times and places of recreational fishing activity. The long-term impacts of a catastrophic spill would depend on the extent to which fish populations recover and the length of time it would take to convince the public that it was again safe to fish in the affected areas.

B.3.1.20. Recreational Resources

Phase 1—Initial Event

The most immediate impacts of a catastrophic spill would be on the recreational fishing and recreational diving activity in the vicinity of the blowout. About 20 percent of the recreational fishing activity and 90 percent of the recreational diving activity in the Gulf of Mexico from Alabama to Texas occurs within 300 ft (91 m) of oil and gas structures (Hiett and Milon, 2002). The impacts on recreational fishing and recreational diving would be greater the closer the blowout occurred to shore. The immediate

response activities could also impact ocean-based recreational activity. Finally, there could be impacts to tourism activity since a catastrophic spill would likely receive a large amount of media attention.

Phase 2—Offshore Spill

While the spill is still offshore, there could be some ocean-dependent recreation that is affected (e.g., fishing, diving, and boating), as discussed above. In addition, there may be some effects due either to perceived damage to onshore recreational resources that has not yet materialized or to general hesitation on the part of travelers to visit the overall region because of the spill. A Congressional hearing into this matter (U.S. House of Representatives, 2010) provides a broad overview of some of the effects that were felt along the Gulf Coast subsequent to the *Deepwater Horizon* explosion, oil spill, and response. For example, a representative of Pinellas County estimated that this area had lost roughly $70 million in hotel revenue even though beaches in this area did not receive any oil damage. This type of effect could be due to misperceptions about the spill, uncertainty about the future of the spill, or concerns about whether a tourism experience will be affected even if the destination is only within close proximity to a spill.

As previously mentioned, recreational diving is one offshore recreational activity that would be particularly affected by a catastrophic oil spill. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

Phase 3—Onshore Contact

A catastrophic spill has the potential to noticeably impact the Gulf Coast recreation and tourism industries. The water-dependent and beach-dependent components of these industries would be particularly vulnerable. Environmental Sensitivity Indexes (ESIs) provide overall measures of the sensitivity of a particular coastline to a potential oil spill. The ESIs rank coastlines from 1 (least sensitive) to 10 (most sensitive). Marshes and swamps are examples of resources that have ESIs of 10 due to the extreme difficulty of removing oil from these areas; marsh and swamp areas are particularly prevalent in Louisiana. The ESIs for beach areas generally range from 3 to 6, depending on the type of sand and the extent to which gravel is mixed into the beach area; beach areas are particularly prevalent in Texas, Mississippi, Alabama, and Florida. The ESI maps for any coastline along the Gulf of Mexico can be viewed using the National Oceanic and Atmospheric Administration's ERMA mapping system (USDOC, NOAA, 2012b and USDOC, NOAA, Office of Response and Restoration, 2014). The ESI maps also provide point indicators for recreational resources.

A catastrophic spill would also raise a number of issues regarding recreational activity that is based on tourism. One important point is that a spill of the *Deepwater Horizon*'s dimensions can influence a much broader range of individuals and firms than can a smaller spill. For example, a small, localized spill may lead some travelers to seek substitute recreational opportunities in nearby areas. However, a large spill is more likely to dissuade travelers from visiting a broader economic region. Similarly, small- and mid-sized restaurant chains and hotels may be able to find other customers or to simply weather a smaller spill. However, a spill the size of the *Deepwater Horizon* is more likely to affect these types of firms since they are less able to diversify their customer base. These effects can be seen in the makeup of those who filed damage claims with BP (Gulf Coast Claims Facility, 2012); the Gulf Coast Claims Facility closed in early 2012 subsequent to preliminary court approval of a settlement program. For example, the bulk of the claims by individuals have been made in the food, beverage, and lodging sector and in the retail, sales, and service sector. Claims have also been made by individuals and firms in a broad range of geographic regions, many of which were not directly impacted by oil.

Murtaugh (2010) provides data on the change in hotel and sales tax receipts for individual Gulf Coast counties in the months immediately following the *Deepwater Horizon* explosion, oil spill, and response. During the summer of 2010, the spill caused substantial declines in hotel receipts in the following counties: Baldwin, Alabama (33.2% decline); Santa Rosa, Florida (24.8% decline); Okaloosa, Florida (24.1% decline); Walton, Florida (12.3% decline); and Bay, Florida (7.4% decline). However, coastal counties west of Baldwin, Alabama (as far west as St. Mary, Louisiana), generally experienced noticeable increases in hotel receipts. This was particularly true in Mobile, Alabama; Jackson, Mississippi; and in the coastal parishes of Louisiana. For example, in Louisiana, St. Mary, Terrebonne, and Lafourche Parishes each reported increases in hotel tax receipts of over 80 percent in the summer of 2010. These effects are likely due to the influx of oil-spill relief workers to these areas in the immediate aftermath of

the *Deepwater Horizon* explosion, oil spill, and response. Overall sales tax receipts in counties from Baldwin, Alabama, eastward also generally fell during 2010, although to a lesser extent than hotel tax receipts. Sales tax receipts in counties and parishes west of Baldwin, Alabama, did not show as clear a pattern as did hotel tax receipts. For example, overall sales tax receipts fell by 12.5 percent in Hancock County (Mississippi), receipts were almost unchanged in Harrison County (Mississippi), and receipts increased by 8.3 percent in Orleans Parish (Louisiana). These results suggest that the impacts of a future catastrophic spill will be influenced by the structure of a particular county/parish's recreational economy, as well as by the extent to which oil-spill-response activities will mitigate some of the negative impacts of the spill in certain areas.

There could also be effects on tourist activities in areas far away from the areas directly affected by oil. For example, in Texas subsequent to the *Deepwater Horizon* explosion, oil spill, and response, some tourists may have stayed away from Texas Gulf Coast beaches due to misperceptions regarding the extent to which these beaches were damaged due to the spill. Conversely, there may have been some substitution of beach visitation away from beaches in the eastern Gulf towards the beaches in Texas, which were farther from the spill. While it is difficult to quantify these effects, some anecdotal evidence regarding this substitution effect can be found in Pack (2010). Hotel occupancy data suggest that these two effects may have largely offset each other. Source Strategies Inc. (2010) reports that total hotel occupancy in the three metro regions in Texas closest to the Gulf Coast increased just 1.9 percent during the third quarter of 2010 compared with the third quarter of 2009. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

Phase 4—Post-Spill, Long-Term Recovery and Response

The longer-term implications of a catastrophic event on tourism would depend on the extent to which any structural/ecological damage can be repaired and the extent to which economic mitigation actions would occur. The long-term implications of a catastrophic spill would also depend on the extent to which public confidence in the various components of the recreational and tourism economies can be restored. For example, restaurants in the region would be impacted to the extent to which they are perceived to use seafood products caught or raised in contaminated waters. Similarly, although beaches can be decontaminated not long after a spill has been stopped, lingering perceptions can be expected to negatively impact tourism even after a spill has ended.

Oxford Economics (2010) attempts to quantify these effects by analyzing the impacts of recent catastrophic events on recreational economies. For example, they analyzed the *Ixtoc I* well blowout and spill of 1979, the scale and nature of which was reasonably similar to the *Macondo* well blowout and spill of 2010. In this example, it took approximately 3 years for beaches to be cleaned and for recreational activity to return to similar levels as before the spill. They also looked at the *Prestige* oil spill of 2002 off the coast of Spain. Given the nature and size of that spill, recreational activity was able to return to pre-spill levels in approximately 1 year. Alaska's tourism economy took approximately 2 years to recover from the *Exxon Valdez* spill.

Overall Summary and Conclusion (Phases 1-4)

A catastrophic spill can cause noticeable impacts to recreational resources such as beaches. A catastrophic spill can also have complex effects on recreational activity that depends on tourism. The longer-term implications of a catastrophic oil spill on tourism would depend on the extent to which any structural/ecological damage can be repaired, the extent to which economic mitigation actions would occur, and the speed at which public confidence in the various components of the affected recreational and tourism economies would be restored.

B.3.1.21. Archaeological Resources

Phase 1—Initial Event

Offshore Archaeological Resources

BOEM protects all known, discovered, and potentially historic and prehistoric archaeological resources on the OCS by requiring appropriate avoidance criteria as well as directives to investigate these

resources. Onshore archaeological resources, prehistoric and historic sites, would not be immediately impacted during the initial phase of a catastrophic blowout because the distance of a blowout site from shore is at least 3 nmi (3.5 mi; 5.6 km). However, offshore catastrophic blowouts, when compared with spills of lesser magnitude, may initially impact multiple archaeological resources. Resources adjacent to a catastrophic blowout could be damaged by the high volume of escaping gas, buried by large amounts of dispersed sediments, crushed by the sinking of the rig or platform, destroyed during emergency relief well drilling, or contaminated by the hydrocarbons.

Based on historical information, over 2,100 potential shipwreck locations have been identified on the Gulf of Mexico OCS (USDOI, MMS, 2007). This number is a conservative estimate and is heavily weighted toward post-19th century, nearshore shipwrecks, where historic records documenting the loss of the vessels were generated more consistently. BOEM currently has confirmed locational data for approximately 380 potential wreck sites, though the historic significance for the majority of these sites has not been determined.

BOEM's Regional Director may require the preparation of an archaeological report to accompany the exploration plan, development operations coordination document, or development and production plan, under 30 CFR § 550.194, and BSEE's Regional Director may do likewise under 30 CFR § 250.194 if a potential wreck is encountered during operations. As part of the environmental reviews conducted for postlease activities, available information is evaluated regarding the potential presence of archaeological resources within the CPA proposed action area to determine if additional archaeological resource surveys and mitigations are warranted. Having complete knowledge of seafloor resources before a spill occurs would enable responders to quickly plan countermeasures in a way that would minimize adverse effects occurring from the spill response.

Phase 2—Offshore Spill

Offshore Archaeological Resources

Due to the response methods (i.e., subsea dispersants) and magnitude of the response (i.e., thousands of vessels), a catastrophic blowout and spill have a greater potential to impact offshore archaeological resources than other accidental events.

Deep Water

In contrast to smaller spills or spills in shallow water, large quantities of subsea dispersants could be used for a catastrophic subsea blowout in deep water. This could result in currently unknown effects from dispersed oil droplets settling to the seafloor. Though information on the actual impacts to submerged cultural resources is inconclusive at this time, oil settling to the seafloor could come in contact with archaeological resources. At present, there is no evidence of this having occurred. A recent experimental study has suggested that, while the degradation of wood in terrestrial environments is initially retarded by contamination with crude oil, at later stages, the biodeterioration of wood is accelerated (Ejechi, 2003). While there are different environmental constraints that affect the degradation of wood in terrestrial and waterlogged environments, soft-rot fungal activity, one of the primary wood degrading organisms in submerged environments, was shown to be increased in the presence of crude oil (Ejechi, 2003). There is a possibility that oil from a catastrophic blowout could come in contact with wooden shipwrecks and artifacts on the seafloor and accelerate their deterioration.

Ancillary damages from vessels associated with oil-spill-response activities (e.g., anchoring) in deep water are unlikely because of the use of dynamically positioned vessels responding to a deepwater blowout. If response and support vessels were to anchor near a deepwater blowout site, the potential to damage undiscovered vessels in the area would be high because of the required number and the size of anchors and the length of mooring chains needed to safely secure vessels. Additionally, multiple offshore vessel decontamination stations would likely be established in shallow water outside of ports or entrances to inland waterways, as seen for the *Deepwater Horizon* explosion, oil spill, and response. The anchoring of vessels could result in damage to both known and undiscovered archaeological sites; the potential to impact archaeological resources increases as the density of anchoring activities in these areas increases.

Shallow Water

The potential for damaging archaeological resources increases as the oil spill and related response activities progress landward. In shallower waters, most of the damage would be associated with oil cleanup and response activities. Thousands of vessels would respond to a shallow-water blowout and would likely anchor, potentially damaging both known and undiscovered archaeological sites. Additional anchoring would be associated with offshore vessel decontamination stations, as described above. As the spill moves into the intertidal zone, the chance of direct contact between the oil and archaeological resources increases. As discussed above, this could result in increased degradation of wooden shipwrecks and artifacts.

Additionally, in shallower waters, shipwrecks often act as a substrate to corals and other organisms, becoming an essential component of the marine ecosystem. These organisms often form a protective layer over the shipwreck, virtually encasing the artifacts and hull remains. If these fragile ecosystems were destroyed as a result of the oil spill and the protective layer was removed, the shipwreck would then be exposed to increased degradation until it reaches a new level of relative stasis with its surroundings.

Regardless of water depth, because oil is a hydrocarbon, heavy oiling could contaminate organic materials associated with archaeological sites, resulting in erroneous dates from standard radiometric dating techniques (e.g., ^{14}C-dating). Interference with the accuracy of ^{14}C-dating would result in the loss of valuable data necessary to understand and interpret the sites.

Phase 3—Onshore Contact

Onshore Archaeological Resources

Regardless of the water depth in which the catastrophic blowout occurs, it is assumed that more than 1,000 mi (1,609 km) of shoreline could be oiled to some degree. Onshore prehistoric and historic sites would be impacted to some extent by a high-volume spill from a catastrophic blowout that reaches shore. Sites on barrier islands could suffer the heaviest impact, and a few prehistoric sites located inland from the coastline, in the marsh, and along bayous could also experience some light oiling. Impacts would include the loss of ability to accurately date organic material from archaeological sites because of contamination or increased research costs to clean samples for analysis. Efforts to prevent coastal cultural resources from becoming contaminated by oil would likely be overwhelmed in the event of a hurricane and by the magnitude of shoreline impacted.

The most significant damage to archaeological sites could be related to cleanup and response efforts. Fortunately, important lessons were learned from the *Exxon Valdez* spill in Alaska in 1989, in which the greatest damage to archaeological sites was related to cleanup activities and looting by cleanup crews rather than from the oil itself (Bittner, 1996). As a result, cultural resources were recognized as significant early in the *Deepwater Horizon* response and cleanup, and archaeologists were embedded in Shoreline Cleanup Assessment Teams (SCAT) and consulting with cleanup crews. Historic preservation representatives were present at both the Joint Incident Command as well as each Area Command under the general oversight of the National Park Service to coordinate response efforts (Odess, official communication, 2010). Despite these efforts, some archaeological sites suffered damage from looting or from spill cleanup activities, most notably the parade ground at Fort Morgan, Alabama (Odess, official communication, 2011).

Phase 4—Post-Spill, Long-Term Recovery and Response

Onshore Archaeological Resources

Regardless of the water depth in which the catastrophic blowout occurs, it is assumed that more than 1,000 mi (1,609 km) of shoreline could be oiled to some degree. Onshore prehistoric and historic sites would be impacted to some extent by a high-volume spill from a catastrophic blowout that reaches shore. A few prehistoric sites in Louisiana, located inland from the coastline in the marsh and along bayous, could experience some light oiling. As discussed above, impacts would include the permanent loss of ability to accurately date organic material from archaeological sites because of contamination. The most significant damage to archaeological sites would be related to cleanup and response efforts. Long-term recovery would prove difficult if not impossible. Historic structures such as coastal forts that are exposed

to oiling are generally constructed of brick or other porous, friable materials that are difficult to clean without causing further damage (Chin and Church, 2010). Funding for any sort or archaeological recovery is problematic outside of Federal lands because of existing laws and regulations (Varmer, 2014). Most coastal prehistoric sites in Louisiana, for example, are on private lands where there is no mechanism to recover damages. Section 106 of the National Historic Preservation Act is triggered by a Federal undertaking, which in the case of a spill, would be the response and not the actual spill. The Natural Resource Damage Assessment (NRDA) process codified by the Oil Pollution Act of 1990 is a legal process to determine the type and amount of restoration needed to compensate the public for harm to natural resources that occurs as a result of an oil spill, but it does not cover cultural, archaeological, or historic properties.

Overall Summary and Conclusion (Phases 1-4)

Archaeological resources are finite, unique, irreplaceable, nonrenewable records of mankind's past, which, once destroyed or damaged, are gone forever. In the event of a catastrophic oil spill, the most likely source of irreversible impact is, ironically, from the spill response, and the danger increases dramatically as the response approaches the shoreline. This damage can, to a large extent, be mitigated by the early integration of archaeologists and State and Tribal historic preservation officers in the response to protect sites from impact. Mitigation of impacts from the oil itself is likely to meet with varied success depending upon the type of site and availability of funding.

B.3.1.22. Land Use and Coastal Infrastructure

Phase 1—Initial Event

There would likely be no adverse impacts to land use and coastal infrastructure as a result of the events and the potential impact-producing factors that could occur throughout Phase 1 of a catastrophic spill event because of the long distance (>3 nmi; 3.5 mi; 5.6 km) from shore and the short duration of the initial event, fire, and/or explosion.

Phase 2—Offshore Spill

Impacts to tourism and recreational resources are addressed in **Chapter B.3.1.20**. Possible fisheries closures are addressed in **Chapters B.3.1.18 and B.3.1.19**. As cleanup and remediation efforts evolve, there would be increased activity at ports and coastal cities, leading to increased traffic on road infrastructure and at port facilities. This follows from consideration of BOEM's scenario estimates of up to 3,000 vessels, 25-50 planes/helicopters, and up to 25,000 workers for a shallow-water event and up to 7,000 vessels, 50-100 planes/helicopters, and up to 50,000 workers for a deepwater event. Waste disposal activities associated with boom deployment and retrieval would increase demand at waste disposal facilities. BOEM's scenario estimates 5 million feet (1.5 million meters) of boom deployment and 35,000 bbl of dispersant applied at the surface for a shallow-water event or 11 million feet (3.4 million meters) of boom deployment and 33,000 bbl of dispersant applied at the surface and 16,500 bbl of dispersant applied subsea for a deepwater event. Also, vessel decontamination sites would be set up offshore and the staffing/maintenance of these sites would contribute to increased activity at port facilities and traffic congestion on coastal waterways and highways.

Phase 3—Onshore Contact

In the event of a catastrophic spill, impacts on land use and infrastructure would be temporary and variable in nature. The scale of impact would depend on the nature of the event and whether it occurs in shallow or deep water. These impacts would include land use in staging areas, waste disposal locations and capacities, and potential delays because of vessel decontamination stations near ports, as described below.

For a shallow-water event, BOEM estimates 5-10 staging areas and 200-300 skimmers. For a deepwater event, scenario estimates call for 10-20 staging areas and 500-600 skimmers. Given these estimates and the several thousand responders that would be involved in the effort, BOEM expects a further increase in traffic congestion and some possible competing land-use issues near the staging areas,

depending on the real estate market at the time of the event. Some infrastructure categories, such as vessels, ports, docks and wharves, would likely become very engaged in response activities and this could result in a shortage of space and functionality at infrastructure facilities if ongoing drilling activities were simultaneously occurring. However, if drilling were to be suspended, conflicting demands on infrastructure facilities would likely fail to materialize.

In the category of waste disposal, the impacts would be more visible as thousands of tons of oily liquid and solid wastes from the oil-spill cleanup would be disposed of in onshore landfills. As was the case in the *Deepwater Horizon* explosion, oil spill, and response, USEPA, in consultation with USCG, would likely issue solid-waste management directives to address the issue of contaminated materials and solid or liquid wastes that are recovered as a result of cleanup operations (USEPA, 2010c and 2010d).

For navigation and port use, there would also be the potential for delays in cargo handling and slow vessel traffic because of decontamination operations at various sites along the marine transportation system (USDOT, 2010). However, vessel decontamination activities most likely would be complete within a year of the event, so impacts would be expected to be limited in duration.

Phase 4—Post-Spill, Long-Term Recovery and Response

Based on the rapid recovery of infrastructure that was heavily damaged by the catastrophic 2005 hurricane season and the region's experience in the few years since the *Deepwater Horizon* explosion, oil spill, and response, BOEM would not expect any long-term impacts to land use and coastal infrastructure as a result of a catastrophic oil-spill event. However, if a catastrophic oil spill were to occur, BOEM would (as it is currently with regard to the *Deepwater Horizon* explosion, oil spill, and response) monitor the post-spill, long-term recovery phase of the event for any changes that indicate otherwise. A catastrophic spill could generate several thousand tons of oil-impacted solid materials disposed in landfills along the Gulf Coast. This waste may contain debris, beach, or marsh material (sand/silt/clay), vegetation, and personal protection equipment collected during cleanup activities. BOEM does not expect that landfill capacity would be an issue at any phase of the oil-spill event or the long-term recovery. In the case of the *Deepwater Horizon* explosion, oil spill, and response, USEPA reported that existing landfills receiving oil-spill waste had plenty of capacity to handle waste volumes; the *Deepwater Horizon* explosion, oil spill, and response's waste that was disposed of in landfills represented less than 7 percent of the total daily waste normally accepted at these landfills (USEPA, 2012).

It is not expected that any long-term, land-use impacts would arise from properties that are utilized for restoration activities and would somehow have their future economic use compromised. The rise or fall of property values would not be solely a function of some kind of economic impact from a catastrophic oil-spill event. There are many other factors that influence the value of property and its best economic use. To date, it is not clear from past experiences whether vegetation loss or erosion created by a spill could result in changes in land use. The amount and location of erosion and vegetation loss could be influenced by the time of year the spill occurs, its location, and weather patterns, including hurricane landfalls.

Overall Summary and Conclusion (Phases 1-4)

There would likely be no adverse impacts to land use and coastal infrastructure throughout Phase 1 of a catastrophic spill event. Response efforts in Phases 2 and 3 would require considerable mobilization of equipment and people. While these efforts might temporarily displace traditional users of coastal land and infrastructure, these interruptions would not be long lasting. The post-spill, long-term recovery and response efforts during Phase 4 could generate several thousand tons of oil-impacted solid materials disposed in landfills along the Gulf Coast, but this would account for no more than 7 percent of the total daily waste normally accepted in these landfills. It is also not expected that any properties utilized for restoration activities throughout Phase 3 would not suffer any long-term land use or economic impacts.

B.3.1.23. Demographics

Phase 1—Initial Event

The impacts of a catastrophic spill on demographics would primarily be driven by the spill's impacts on employment (refer to **Chapter B.3.1.24**). Since the impacts of a catastrophic spill on employment

would take time to evolve, the initial impacts on demographics would be minimal. Therefore, there would likely be no adverse impacts to demographics as a result of the events and the potential impact-producing factors that could occur throughout Phase 1 of a catastrophic spill event.

Phase 2—Offshore Spill

The impacts of a catastrophic spill on demographics would primarily be driven by the spill's impacts on employment (refer to **Chapter B.3.1.24**). For example, there could be some suspension of oil/gas activities in the immediate aftermath of the spill. This could cause some workers to seek employment outside of the OCS industry, for example in onshore oil/gas extraction or on overseas offshore projects. However, since the OCS oil and gas industry would likely eventually recover, the long-term impacts on demographics would be small. There could also be impacts on demographics if employment in recreation, tourism, or fishing industries were affected, due to either actual or perceived impacts of the spill. However, the impacts on these industries would become more acute if the spill were to reach shore.

Phase 3—Onshore Contact

The impacts of a catastrophic spill on demographics would primarily be driven by the spill's impacts on employment (refer to **Chapter B.3.1.24**). For example, impacts to recreation/tourism and recreational and commercial fishing activities would become more acute if the spill were to reach shore. There would also be a larger presence of cleanup workers in some areas if the spill were to reach shore. For example, 48,200 workers were employed in response activities at the peak of the response effort following the *Macondo* well blowout and spill (RestoreTheGulf.gov, 2011). However, these impacts would be temporary and would be governed by the dynamics of the particular spill. There could also be impacts to demographics if there were impacts on the response workers' health or if the demographics of the response workers were noticeably different from the local population.

Phase 4—Post-Spill, Long-Term Recovery and Response

The impacts of a catastrophic spill on demographics would primarily be driven by the spill's impacts on employment (refer to **Chapter B.3.1.24**). The spill's impacts on employment, and therefore demographics, would primarily be felt in the oil/gas, recreational fishing, commercial fishing, and recreation/tourism industries. However, it is unlikely that a catastrophic spill would cause substantial long-term changes to a region's demographics. For example, the demographics data in Woods and Poole Economics, Inc. (2011) did not suggest large demographic changes to any Gulf regions subsequent to the *Deepwater Horizon* explosion, oil spill, and response.

Overall Summary and Conclusion (Phases 1-4)

The impacts of a catastrophic spill on demographics would primarily be driven by the spill's impacts on employment (refer to **Chapter B.3.1.24**). These impacts would likely be temporary and would be governed by the particular dynamics of the spill.

B.3.1.24. Economic Factors

Phase 1—Initial Event

The most immediate economic impacts of a catastrophic spill would be on the oil/gas production and employment associated with the area of the spill. There could also be impacts on commercial fishing (**Chapter B.3.1.18**), recreational fishing (**Chapter B.3.1.19**), and recreational resources (**Chapter B.3.1.20**). However, the primary economic impacts of a catastrophic spill would depend how the spill evolves, which is discussed in subsequent sections.

Phase 2—Offshore Spill

In contrast to a less severe accidental event, suspension of some oil and gas activities would be likely following a catastrophic event. Depending on the duration and magnitude, this could impact hundreds of

oil-service companies that supply the steel tubing, engineering services, drilling crews, and marine supply boats critical to offshore exploration. An interagency economic report estimated that the suspension arising from the *Deepwater Horizon* explosion, oil spill, and response may have directly and indirectly resulted in up to 8,000-12,000 fewer jobs along the Gulf Coast (USDOC, Economics and Statistics Administration, 2010). Greater New Orleans, Inc. (2012) provides an overview of the impacts of decreased oil and gas industry operations subsequent to the *Deepwater Horizon* explosion, oil spill, and response. This report provides survey evidence regarding the various economic strains felt by businesses in Louisiana due to the *Deepwater Horizon* explosion, oil spill, and response. For example, this report found that 41 percent of the respondents were not making a profit due to the slowdown in operations. The economic impacts of a catastrophic spill would likely be more heavily concentrated in smaller businesses than in the larger companies due to their difficulty in finding substitute revenue sources. Much of the employment loss would be concentrated in coastal oil-service parishes in Louisiana (St. Mary, Terrebonne, Lafourche, Iberia, and Plaquemines Parishes) and counties/parishes where drilling-related employment is most concentrated (Harris County, Texas, in which Houston is located, and Lafayette Parish, Louisiana). There could also be economic impacts due to the impacts on commercial fishing (**Chapter B.3.1.18**), recreational fishing (**Chapter B.3.1.19**), and recreational resources (**Chapter B.3.1.20**).

Phase 3—Onshore Contact

By the end of a catastrophic spill, a large number of personnel (up to 25,000 in the event of a shallow-water spill and up to 50,000 in the event of a deepwater spill) would be expected to have responded to protect the shoreline and wildlife and to cleanup vital coastlines. The degree to which new cleanup jobs offset job losses would vary greatly from county to county (or parish to parish). However, these new jobs would not make up for lost jobs, in terms of dollar revenue. In most cases, cleanup personnel are paid less (e.g., $15-$18 per hour compared with roughly $45 per hour on a drilling rig), resulting in consumers in the region having reduced incomes overall and thus, spending less money in the economy (Aversa, 2010). In addition, the economic impacts of relief workers would likely vary by county or parish, causing noticeable positive economic impacts to some counties or parishes while having fairly small positive impacts in other counties or parishes (Murtaugh, 2010). However, the influx of relief workers could also cause some negative impacts if it disrupted some of the normal functioning of economies. In addition, if the spill reaches shore, the impacts to commercial fishing (**Chapter B.3.1.18**), recreational fishing (**Chapter B.3.1.19**), and recreational resources (**Chapter B.3.1.20**) would likely be greater.

In the unfortunate event of a future disaster, the creation of a large financial claims administration process, similar to the Gulf Coast Claims Facility, would be likely. This administrative body would be responsible for distributing funds made available by the responsible party to parties financially hurt by the disaster. As demonstrated by the actions of Gulf Coast Claims Facility recipients following the *Deepwater Horizon* explosion, oil spill, and response, funds will likely be used by individuals to pay for necessities such as mortgages or groceries, while businesses who receive funds will likely use them to maintain payroll and current payments on equipment. During its tenure, over $6 billion had been paid through the Gulf Coast Claims Facility, which mitigated some of the economic impacts of the *Deepwater Horizon* explosion, oil spill, and response (Gulf Coast Claims Facility, 2012).

Phase 4—Post-Spill, Long-Term Recovery and Response

While a catastrophic spill could immediately impact several Gulf Coast States for several months through fishing closures, loss of tourism, and any suspension of oil and gas activities, anticipating the long-term economic and employment impacts in the Gulf of Mexico is a difficult task. Many of the potentially affected jobs, like fishing charters, are self-employed. Thus, they would not necessarily file for unemployment and will not be included in business establishment surveys used to estimate State unemployment levels. In addition, unemployment numbers in states are based on nonagricultural jobs, and the fishing industry is considered within the agriculture category. On the other side, it is also a challenge to estimate how many of these displaced workers have been hired to clean up the spill. For example, while thousands of vessels of opportunity would be active in the spill response, not all of these would be displaced commercial fishermen from the affected areas. The positive employment impacts related to response activities are likely to be shorter term than the negative impacts discussed above.

However, the long-term economic impacts of a catastrophic spill will likely depend on the speed at which the oil/gas, commercial fishing, recreational fishing, and recreational industries recover.

Overall Summary and Conclusion (Phases 1-4)

There would be a number of economic impacts that would arise from a catastrophic oil spill. The most direct effects would be on the recreation/tourism, commercial fishing, and recreational fishing industries that depend on damaged resources. There could also be substantial negative effects on the oil/gas industry due to moratoriums or rule changes that would arise. Finally, there could be substantial impacts due to the relief operations and economic mitigation activities that would occur in the aftermath of a catastrophic spill.

B.3.1.25. Environmental Justice

Phase 1—Initial Event

There would likely be no adverse impacts to environmental justice as a result of the events and the potential impact-producing factors that could occur throughout Phase 1 of a catastrophic spill event because of the long distance (>3 nmi; 3.5 mi; 5.6 km) from shore and the short duration of the initial event, fire, and/or explosion.

Phase 2—Offshore Spill

The environmental justice policy, based on Executive Order 12898 of February 11, 1994, directs agencies to incorporate into NEPA documents an analysis of potentially disproportionate and detrimental environmental and health effects of their proposed actions on minorities and low-income populations and communities. While the spill is still offshore, the primary environmental justice concern would be large commercial fishing closures disproportionately impacting minority fishers. In the event of a catastrophic spill, Federal and State agencies would be expected to close substantial portions of the Gulf to commercial and recreational fishing (USDOC, NOAA, 2010e). While oystering occurs "onshore," oyster beds are also likely to be closed to harvests during Phase 2 of a catastrophic spill because of concerns about oil contamination and increased freshwater diversions to mitigate oil intrusion into the marshes. These closures would directly impact commercial fishermen and oystermen, and indirectly impact such downstream activities as shrimp processing facilities and oyster shucking houses. The mostly African-American communities of Phoenix, Davant, and Point à la Hache in Plaquemines Parish, Louisiana, are home to families with some of the few black-owned oyster leases. Just as these leases have been threatened by freshwater diversion projects for coastal restoration, they could be threatened by Phase 2 of a catastrophic spill (Mock, 2010).

The Gulf Coast hosts multiple minority and low-income groups whose use of natural resources of the offshore and coastal environments make them vulnerable to fishing closures. While not intended as an inventory of the area's diversity, we have identified several Gulf Coast populations of particular concern. An estimated 20,000 Vietnamese American fishermen and shrimpers live along the Gulf Coast; by 1990, over 1 in 20 Louisiana fishers and shrimpers had roots in Southeast Asia even though they comprised less than half a percent of the State's workforce (Bankston and Zhou, 1996). Vietnamese Americans account for about one-third of all the fishermen in the central Gulf of Mexico (Ravitz, 2010). Islaños, African Americans, and Native American groups are also engaged in commercial fishing and oystering. Historically, Vietnamese Americans and African Americans have worked in the fish processing and oyster shucking industries. Shucking houses particularly, have provided an avenue into the mainstream economy for minority groups.

Therefore, fishing closures during Phase 2 of a catastrophic spill impacting the central Gulf of Mexico may disproportionately affect such minority groups as the Vietnamese Americans, Native Americans, African Americans, and Islaños (Hemmerling and Colten, 2003).

Phase 3—Onshore Contact

While most coastal populations along the Gulf Coast are not generally minority or low income, several communities on the coasts of St. Mary, Lafourche, Terrebonne, St. Bernard, and Plaquemines

Parishes, Louisiana, have minority or low-income population percentages that are higher than their state average. These minority populations are predominately Native American, Isleños, or African American. For example, a few counties or parishes along the Gulf Coast have more than a 2-percent Native American population (USDOI, MMS, 2007); about 2,250 Houma Indians (a State of Louisiana recognized tribe) are concentrated in Lafourche Parish, Louisiana, comprising 2.4 percent of the parish's population, and about 800 Chitimacha (a federally recognized tribe) make up 1.6 percent of St. Mary Parish's population. While these are not significant numbers on their own, viewed in the context of Louisiana's overall 0.6 percent Native American average, these communities take on greater environmental justice importance.

Gulf Coast minority and low-income groups are particularly vulnerable to the coastal impacts of a catastrophic oil spill due to their greater than average dependence on the natural resources in the offshore and coastal environments. Besides their economic reliance on commercial fishing and oystering, coastal low-income and minority groups rely heavily on these fisheries and other traditional subsistence fishing, hunting, trapping, and gathering activities to augment their diets and household incomes (refer to Hemmerling and Colton, 2003, for an evaluation of environmental justice considerations for south Lafourche Parish). Regular commuting has continued this reliance on the natural resources of the coastal environments even when populations have been forced to relocate because of land loss and the destruction from hurricane events.

State fishery closures because of a catastrophic oil spill could disproportionately affect minority and low-income groups. Shoreline impacts could generate additional subsistence-related effects. Therefore, these minority groups may be disproportionately affected if these coastal areas were impacted by a catastrophic spill and the resulting response.

Phase 4—Post-Spill, Long-Term Recovery and Response

After the spill is stopped, the primary environmental justice concerns relate to possible long-term health impacts to cleanup workers, a predominately minority population, and to possible disposal of oil-impacted solid waste in predominantly minority areas.

An analysis of socioeconomic characteristics shows that people of Cajun ethnicity in the Gulf Coast States are often found to be of a comparatively low socioeconomic status and to work jobs in the textile and oil industries (Henry and Bankston, 1999). Past studies suggest that a healthy offshore petroleum industry also indirectly benefits low-income and minority populations (Tolbert, 1995). One BOEM-funded study in Louisiana found income inequality decreased during the oil boom of the 1980's and increased with the decline (Tolbert, 1995). If there is a suspension of oil and gas activities in response to a catastrophic spill, many oil- and gas-related service industries would attempt to avoid massive layoffs by cutting costs and deferring maintenance during the recovery. This was the case with the *Deepwater Horizon* explosion, oil spill, and response, and the long-term impacts are still not fully understood.

Onshore and Offshore Cleanup Workers

By the end of a catastrophic spill, up to 25,000 (shallow water) or 50,000 (deep water) personnel would be expected to be responding to the spill. The majority of these would be field responders (United Incident Command, 2010e). As seen by the *Deepwater Horizon* explosion, oil spill, and response, the racial composition of cleanup crews was so conspicuous that Ben Jealous, the president of the National Association for the Advancement of Colored People, sent a public letter to BP Chief Operations Officer Tony Hayward on July 9, 2010, demanding to know why African Americans were over-represented in "the most physically difficult, lowest paying jobs, with the most significant exposure to toxins" (National Association for the Advancement of Colored People, 2010). While regulations require the wearing of protective gear and only a small percentage of cleanup workers suffer immediate illness and injuries (Centers for Disease Control and Prevention, 2010), exposure could have long-term health impacts (e.g., increased rates of some types of cancer) (Savitz and Engel, 2010; Kirkeleit et al., 2008). Aguilera et al. (2010) compiled and reviewed existing studies on the repercussions of spilled oil exposure on human health for patterns of health effects and found evidence of the relationship between exposure and "acute physical, psychological, genotoxic, and endocrine effects in the exposed individuals." Acute symptoms from exposure to oil, dispersants, and degreasers include headaches, nausea, vomiting, diarrhea, sore eyes, runny nose, sore throat, cough, nose bleeds, rash, blisters, shortness of breath, and dizziness

(Sathiakumar, 2010). The USEPA's monitoring data have not shown that the use of dispersants during the *Deepwater Horizon* explosion, oil spill, and response resulted in a presence of chemicals that surpassed human health benchmarks (Trapido, 2010). The potential for the long-term human health effects are largely unknown. However, the National Institute of Environmental Health Sciences is conducting a study known as the "Gulf Long-Term Follow-Up Study" that should provide a better understanding of the long-term and cumulative health impacts, such as the consequences of working close to a spill and of consuming contaminated seafood. The "Gulf Long-Term Follow-up Study" will monitor oil-spill cleanup workers for 10 years and represents a national effort to determine if the Gulf oil spill led to physical or mental health problems (U.S. Dept. of Health and Human Services, NIEHS, 2010). The study has a target goal of 55,000 participants. As of October 2012, the National Institute of Environmental Health Sciences announced that over 29,000 cleanup workers and volunteers have enrolled in the "Gulf Long-Term Follow-up Study" (U.S. Dept. of Health and Human Services, NIEHS, 2012). Prior research on post-spill cleanup efforts found that the duration of cleaning work was a risk factor for acute toxic symptoms and that seamen had the highest occurrence of toxic symptoms compared with volunteers or paid workers. Therefore, participants in the "Vessels of Opportunity" program, which recruited local boat owners (including Cajun, Houma Indian, and Vietnamese American fishermen) to assist in cleanup efforts, would likely be one of the most exposed groups. African Americans are thought to have made up a high percentage of the cleanup workforce. The Occupational Safety and Health Administration (OSHA) released two matrices of gear requirements for onshore and offshore Gulf operations that were organized by task (U.S. Dept. of Labor, OSHA, 2010a). Of past oil-spill workers, uninformed and poorly informed workers were at more risk of exposure and symptoms, demonstrating the importance of education and proper training of workers (Sathiakumar, 2010). Therefore, a catastrophic spill may disproportionately affect seamen and onshore workers such as Cajuns, Vietnamese Americans, Houma Indian, and African Americans.

Solid-Waste Disposal

Following a catastrophic spill, environmental justice concerns arise related to the disposal of cleanup-related wastes near minority and/or low-income communities (Schleifstein, 2010). It is estimated that a catastrophic spill could generate several thousand tons of oil-impacted solid materials that would be disposed in landfills along the Gulf Coast. While no new landfills would be built because of a catastrophic spill, the use of existing landfills might exacerbate existing environmental justice issues. For example, Mobile, Alabama, and Miami, Florida, are majority minority urban centers with a majority of minority residents living within a 1-mi (1.6-km) radius of chosen landfills or liquid processing centers. While only a small percentage of *Deepwater Horizon* explosion, oil spill, and response waste was sent to these facilities—13 percent of the liquid waste to Liquid Environmental Solutions in Mobile and only 0.28 percent of the total liquid waste to Cliff Berry in Miami—they may receive more from potential future spills. Disposal procedures for the *Deepwater Horizon* explosion, oil spill, and response involved sorting waste materials into standard "waste stream types" at small, temporary stations, and then sending each type to existing facilities that were licensed to dispose of them. The location of temporary sorting stations was linked to the location of containment and cleanup operations. Hence, future locations of any sorting stations are not predictable since they would be determined by the needs of cleanup operations. However, waste disposal locations were determined by the specializations of existing facilities and by contractual relationships between them and the cleanup and containment firms. Louisiana received about 82 percent of the *Deepwater Horizon* explosion, oil spill, and response liquid waste recovered; of this, 56 percent was manifested to mud facilities located in Venice in Plaquemines Parish, Louisiana, and to Port Fourchon in Lafourche Parish, Louisiana, and then transferred to a processing facility in Port Arthur, Texas. The waste remaining after processing was sent to deep well injection landfills located in Fannett and Big Hill, Texas. The sites located in Venice and Port Fourchon, Louisiana, and in Port Arthur, Fannett, and Big Hill, Texas, have low-minority populations, but a few of these areas have substantial poverty rates relative to State and parish/county means.

Overall Summary and Conclusion (Phases 1-4)

For Phase 1 (Initial Event) of a catastrophic spill, there would likely be no adverse impacts to minority and low-income communities because of the long distance (>3 nmi; 3.5 mi; 5.6 km) from shore,

as well as the short duration of the initial event, fire, and/or explosion. The primary environmental justice concerns during Phase 2 (Offshore Spill) would be large-scale fishing closures, oyster bed contamination and closures, and subsequent impacts to downstream activities such as shrimp processing facilities and oyster shucking houses. These may disproportionately affect such minority groups as the Vietnamese Americans, Native Americans, African Americans, and Islaños. Phase 3 (Onshore Contact), depending on the location, could result in disproportional impacts to those groups that rely heavily on oystering, commercial fishing, and other traditional subsistence fishing, hunting, trapping, and gathering activities to augment their diets and household incomes. During Phase 4 (Post-Spill, Long-Term Recovery and Response), the primary environmental justice concerns relate to possible long-term health impacts to cleanup workers, a predominately minority population, and to the possible disposal of oil-impacted solid waste in predominantly minority areas. As in the case of the *Deepwater Horizon* explosion, oil spill, and response, understanding long-term impacts would be dependent on the outcome of ongoing research by various interested parties, such as the National Institutes of Health and BOEM. Overall, depending on a number of mainly geographic variables such as the location of fisheries closures and oyster bed contamination and closures, as well as the demographic composition of cleanup workers, and if waste disposal was not distributed across the region at many different facilities, a catastrophic oil-spill event may have disproportionate effects on minority and low-income populations.

B.3.1.26. Species Considered due to U.S. Fish and Wildlife Service Concerns

Phase 1—Initial Event

Phase 1 of the scenario is the initiation of a catastrophic blowout incident. Impacts, response, and intervention depend on the spatial location of the blowout and leak. For this analysis, an explosion and subsequent fire are assumed to occur. If a blowout associated with the drilling of a single exploratory well occurs, this could result in a fire that would burn for 1 or 2 days. If a blowout occurs on a production platform, other wells could feed the fire, allowing it to burn for over a month. The drilling rig or platform may sink. If the blowout occurs in shallow water, the sinking rig or platform may land in the immediate vicinity; if the blowout occurs in deep water, the rig or platform could land a great distance away, beyond avoidance zones. Regardless of water depth, the immediate response would be from search and rescue vessels and aircraft, such as USCG cutters, helicopters, and rescue planes, and firefighting vessels. The potential impacts reflect the explosion, subsequent fire for 1-30 days, and the sinking of the platform in the immediate vicinity and up to 1 mi (1.6 km) from the well.

The scenarios for each phase, including cleanup methods, can be found **Table B-4**.

BOEM has only focused on species within coastal counties and parishes because those are the species that could be potentially impacted by oil and gas development activities, including a potential OCS spill. There would likely be no adverse impacts to the species considered due to FWS concerns as a result of the events and the potential impact-producing factors that could occur throughout Phase 1 of a catastrophic spill event due to the distance of most activities, the heavy regulation of infrastructure and pipelines, and permitting and siting requirements.

Phase 2—Offshore Spill

Phase 2 of the analysis focuses on the spill and response in Federal and State offshore waters. A catastrophic spill would likely spread hundreds of square miles. Also, the oil slick may break into several smaller slicks, depending on local wind patterns that drive the surface currents in the spill area. The potential impacts reflect spill and response in Federal and State offshore waters. Season and temperature variations can result in different resource impacts due to variations in oil persistence and oil and dispersant toxicity and because of differences in potential exposure of the resources throughout various life cycle stages.

There would likely be no adverse impacts to the species considered due to FWS concerns as a result of the events and the potential impact-producing factors that could occur throughout Phase 2 of a catastrophic spill event due to the distance of most activities, the heavy regulation of infrastructure and pipelines, and permitting and siting requirements.

Phase 3—Onshore Contact

Phase 3 focuses on nearshore (e.g., inside bays and in close proximity to shoreline) and onshore spill response and oil initially reaching the shoreline during the spill event or while the oil still persists in the offshore environment once the spillage has been stopped. It is likely that Phases 2 and 3 could occur simultaneously. The duration of the initial shoreline oiling is measured from initial shoreline contact until the well is capped or killed and the remaining oil dissipates offshore. Re-oiling of already cleaned or previously impacted areas could be expected during Phase 3. In addition to the response described in Phase 2, nearshore and onshore efforts would be introduced in Phase 3 as oil entered coastal areas and contacted shore. The potential impacts reflect the spill and response in very shallow coastal waters and once along the shoreline. Season and temperature variations can result in different resource impacts due to variations in oil persistence and oil and dispersant toxicity and because of differences in potential exposure of the resources throughout various life cycle stages.

The FWS has explicitly communicated interest in specific species within State boundaries along the Gulf Coast. The species within Louisiana, Mississippi, Alabama, and Florida have been designated as endangered, threatened, candidate, listed with critical habitat, proposed nonessential experimental population, or distinct vertebrate population. The greatest threats to the majority of these species are the loss of and/or modification to suitable habitat caused by urban and agricultural development. Further detail on this catastrophic OSRA run is contained in Appendix C of the CPA 235/241/247 Supplemental EIS.

At this time, there is no known record of a hurricane crossing the path of a large oil spill; the impacts of such have yet to be determined. The experience from Hurricanes Katrina and Rita in 2005 was that the oil released during the storms widely dispersed as far as the surge reached (USDOC, NOAA, National Weather Service, 2012). Due to their reliance on terrestrial habitats to carry out their life-history functions at a considerable distance from the GOM, the activities of the CPA proposed action are unlikely to have significant adverse effects on the size and recovery of any of the FWS-mentioned species or populations in Texas, Louisiana, Mississippi, Alabama, and Florida.

There would likely be no adverse impacts to the species considered due to FWS concerns as a result of the events and the potential impact-producing factors that could occur throughout Phase 3 of a catastrophic spill event due to the distance of most activities, the heavy regulation of infrastructure and pipelines, and permitting and siting requirements.

Phase 4—Post-Spill, Long-Term Recovery and Response

Phase 4 focuses on long-term recovery once the well has been capped and the spill has stopped. During the final phase of a catastrophic blowout and spill, it is presumed that the well has been capped or killed and cleanup activities are concluding. While it is assumed that the majority of spilled oil would be dissipated offshore within 1-2 months (depending on season and temperature) of stopping the flow, oil has the potential to persist in the environment long after a spill event and has been detected in sediment 30 years after a spill. On sandy beaches, oil can sink deep into the sediments. In tidal flats and salt marshes, oil may seep into the muddy bottoms. The potential impacts reflect long-term persistence of oil in the environment and residual and long-term cleanup efforts.

As data continue to be gathered and impact assessments completed, a better characterization of the full scope of impacts to populations in the GOM from the *Deepwater Horizon* explosion, oil spill, and response will be available. Relevant data on the status of populations after the *Deepwater Horizon* explosion, oil spill, and response may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion, oil spill, and response may be difficult or impossible to discern from other factors. Therefore, it is not possible for BOEM to obtain this information within the timeline contemplated in this Supplemental EIS, regardless of the cost or resources needed. In light of the incomplete or unavailable information, BOEM's subject-matter experts have used available scientifically credible evidence in this analysis and applied it using accepted methods and approaches. Nevertheless, a complete understanding of the missing information is not essential to a reasoned choice among alternatives for this Supplemental EIS. As of August 2016, there are 2,896 active leases in the CPA with either ongoing or the potential for exploration, drilling, and production activities. Leasing information is updated monthly and can be found on BOEM's website at http://www.boem.gov/Gulf-of-Mexico-Region-Lease-Map/. In addition, non-OCS energy-related activities will continue to occur in the CPA irrespective of the CPA proposed action

(i.e., habitat loss and competition). The potential for effects from changes to the affected environment (post-*Deepwater Horizon* explosion, oil spill, and response), accidental spills (including low-probability catastrophic spills), and cumulative effects remains whether or not the No Action or an Action alternative is chosen under this Supplemental EIS.

There would likely be no adverse impacts to the species considered due to FWS concerns as a result of the events and the potential impact-producing factors that could occur throughout Phase 4 of a catastrophic spill event due to the distance of most activities, the heavy regulation of infrastructure and pipelines, and permitting and siting requirements.

Overall Summary and Conclusion (Phases 1-4)

Accidental blowouts, oil spills, and spill-response activities resulting from the CPA proposed action have the potential to impact small to large areas in the GOM, depending on the magnitude and frequency of accidents, the ability to respond to accidents, the location and date of accidents, and various meteorological and hydrological factors (including tropical storms). The incremental contribution of the CPA proposed action would not be likely to result in a significant incremental impact on the FWS-mentioned species within the CPA; in comparison, non-OCS-related activities, such as habitat loss and competition, have historically proved to be of greater threat to the FWS-mentioned species.

In conclusion, within the CPA, there is a long-standing and well-developed OCS Program (more than 50 years); there are no data to suggest that activities from the preexisting OCS Program are significantly impacting the FWS mentioned species populations; therefore, the CPA proposed action would be expected to have little or no effect on the FWS-mentioned species.

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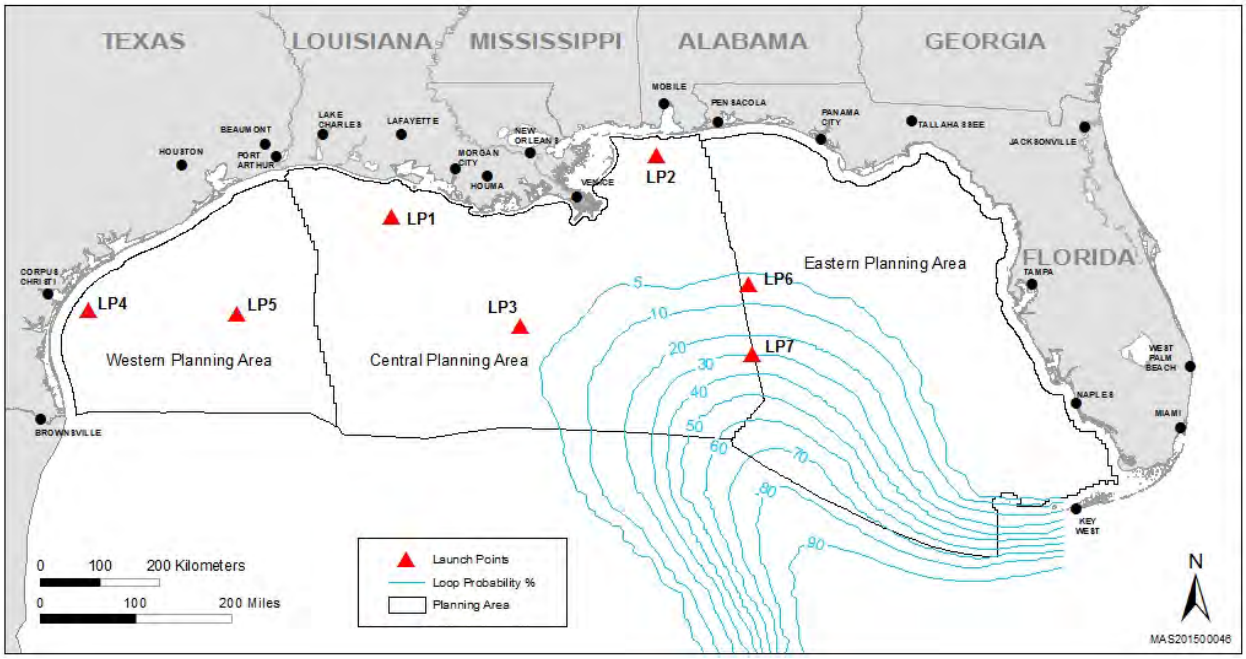

Figure B-1. Location of Seven Hypothetical Oil-Spill Launch Points for OSRA within the Gulf of Mexico. (Spatial variability of the Loop Current is from Vukovich [2007] and is shown as percent of time that the Loop Current watermass is associated with a particular location.)

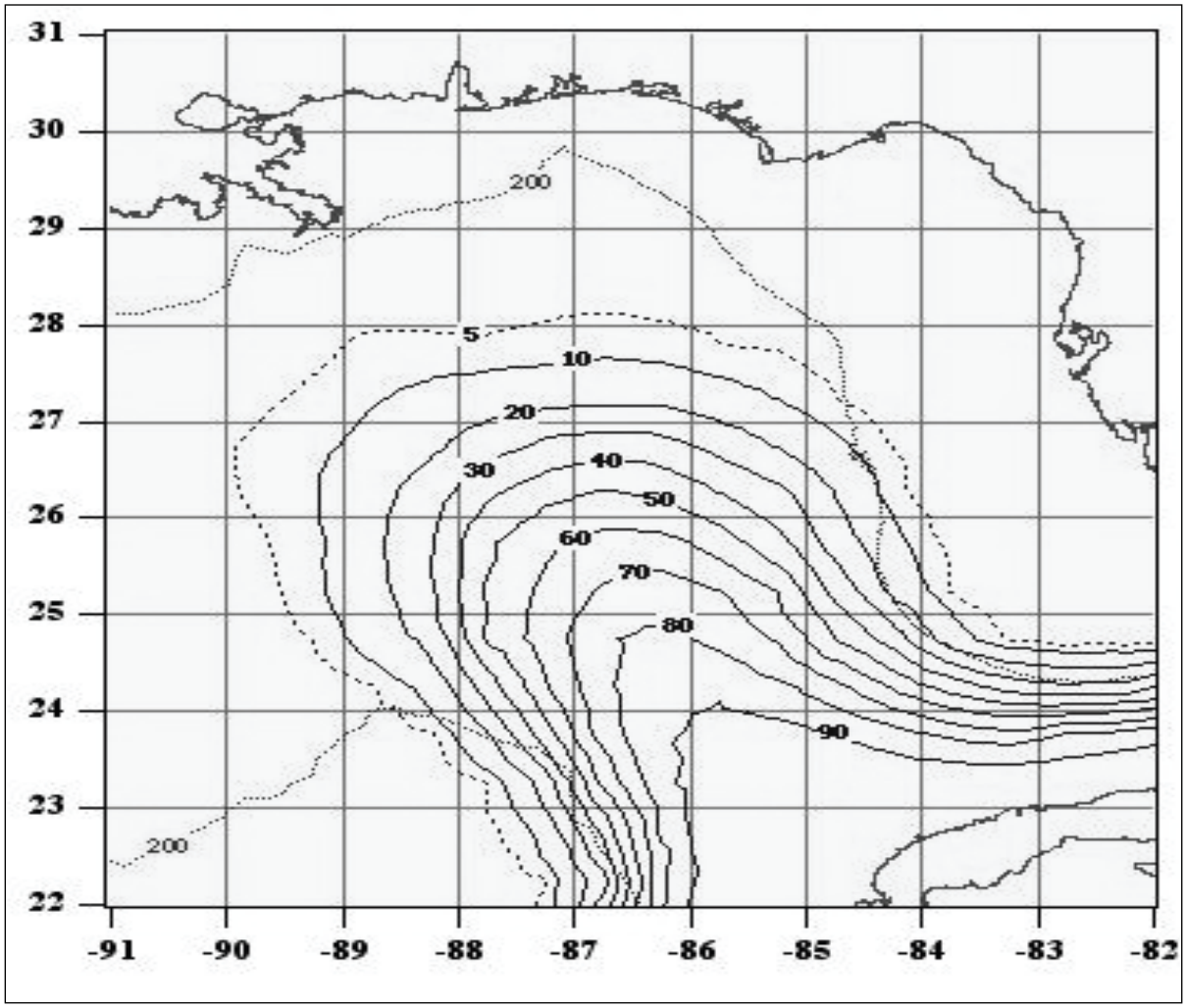

Figure B-2. Spatial Frequency (%) of the Watermass Associated with the Loop Current in the Eastern Gulf of Mexico based on Data for the Period 1976-2003 (Vukovich, 2005).

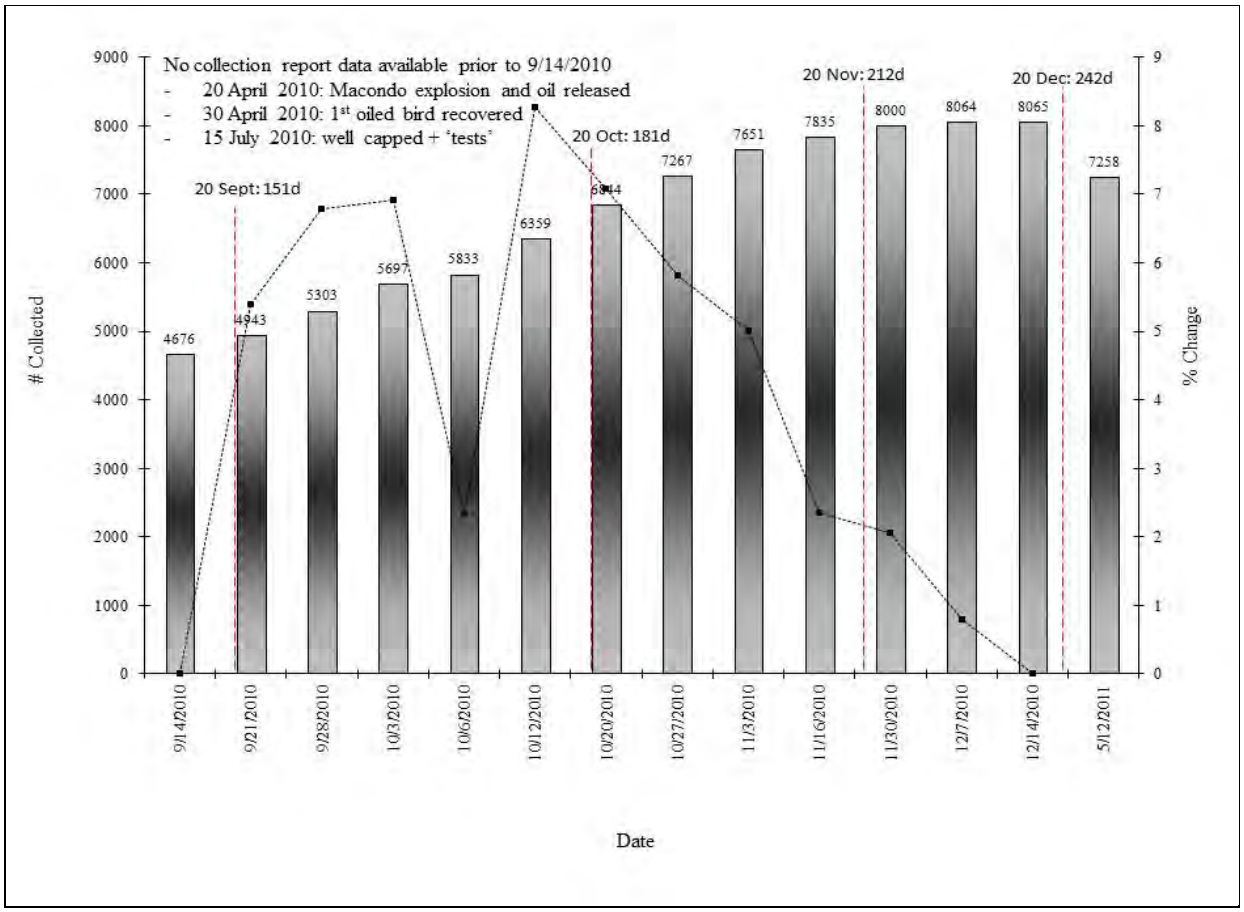

Figure B-3. Summary of Avian Species Collected by Date Obtained from the U.S. Fish and Wildlife Service as Part of the *Deepwater Horizon* Post-Spill Monitoring and Collection Process through May 12, 2011 (USDOI, FWS, 2011a). (This figure represents the date the data were released and reported and does not represent the actual date individual birds were collected. Data on the Y-axis reflect the cumulative # of individual birds collected, identified, and summarized by date; data on the Z-axis reflect proportional change from one reporting date to the next. The data used in this figure are verified as per FWS's QA/QC processes. The mean # of birds collected between intervals is 184.4 + 89.3 SE [-807 min, 526 max for 13 collection intervals] and the mean % change between intervals is 3.0 + 1.3% [-11.12% min., 8.27% max]. We have no data on change in search effort temporally (or spatially) and also lack data prior to September 14, 2010; therefore, data at that point represent the baseline or "0" for determining interval differences. Disclaimer: All data should be considered provisional, incomplete, and subject to change. For more information, refer to FWS's Weekly Bird Impact Data and Consolidated Wildlife Reports [USDOI, FWS, 2011a]; for additional information on the chronological change in number of birds collected, refer to Belanger et al., 2010).

Table B-1

Blowout Scenarios and Key Differences in Impacts, Response, and/or Intervention

Location of Blowout and Leak	Key Differences in Impacts, Response, and/or Intervention
Blowout occurs at the sea surface (i.e., at the rig)	Offers the least chance for oil recovery because of the restricted access to the release point; therefore, greater impacts to coastal ecosystems. In addition to relief wells, there is potential for other intervention measures such as capping and possible manual activation of blowout-preventer (BOP) rams.
Blowout occurs along the riser anywhere from the seafloor to the sea surface. However, a severed riser would likely collapse, resulting in a leak at the seafloor.	In deep water, the use of subsea dispersants, if approved, may reduce impacts to coastal ecosystems; however, their use may increase exposure of deepwater marine resources to dispersed oil. There is a possibility for limited recovery of oil at the source. In addition to relief wells, there is potential for other intervention measures, such as capping and possible manual activation of BOP rams.
At the seafloor, through leak paths on the BOP/wellhead	In deep water, the use of subsea dispersant, if approved, may reduce impacts to coastal ecosystems; however, their use may increase exposure of deepwater marine resources to dispersed oil. With an intact subsea BOP, intervention may involve the use of drilling mud to kill the well. If the BOP and well stack are heavily compromised, the only intervention method may be relief wells. Greatest possibility for recovery of oil at the source, until the well is capped or killed.
Below the seafloor, outside the wellbore (i.e., broached)	Disturbance of a large amount of sediments resulting in the burial of benthic resources in the immediate vicinity of the blowout. The use of subsea dispersants would likely be more difficult (PCCI Marine and Environmental Engineering, 1999). Stopping this kind of blowout would probably involve relief wells. Any recovery of oil at the seabed would be very difficult.

Table B-2

Properties and Persistence by Oil Component Group

Properties and Persistence	Light-Weight	Medium-Weight	Heavy-Weight
Hydrocarbon Compounds	Up to 10 carbon atoms	10-22 carbon atoms	>20 carbon atoms
API º	>31.1º	31.1º-22.3º	<22.3º
Evaporation Rate	Rapid (within 1 day) and complete	Up to several days; not complete at ambient temperatures	Negligible
Solubility in Water	High	Low (at most a few milligrams/liter)	Negligible
Acute Toxicity	High because of monoaromatic hydrocarbons (BTEX)	Moderate because of diaromatic hydrocarbons (naphthalenes—2 ring PAHs)	Low except because of smothering (i.e., heavier oils may sink)
Chronic Toxicity	None, does not persist because of evaporation	PAH components (e.g., naphthalenes—2 ring PAHs)	PAH components (e.g., phenanthrene, anthracene—3 ring PAHs)
Bioaccumulation Potential	None, does not persist because of evaporation	Moderate	Low, may bioaccumulate through sediment sorption
Compositional Majority	Alkanes and cycloalkanes	Alkanes that are readily degraded	Waxes, asphaltenes, and polar compounds (not significantly bioavailable or toxic)
Persistence	Low because of evaporation	Alkanes readily degrade, but the diaromatic hydrocarbons are more persistent	High; very low degradation rates and can persist in sediments as tarballs or asphalt pavements

API = American Petroleum Institute.
BTEX = benzene, ethylbenzene, toluene, and xylene
PAH = polycyclic aromatic hydrocarbon

Sources: Michel, 1992; Canadian Center for Energy Information, 2010.

Table B-3

Annual Volume of Produced Water Discharged by Depth
(millions of barrels)

Year	Shelf 0-60 m	Shelf 60-200 m	Slope 200-400 m	Deepwater 400-800 m	Deepwater 800-1,600 m	Ultra-Deepwater 1,601-2,400 m	Ultra-Deepwater >2,400 m	Total
2000	370.6	193.1	35.5	25.6	12.2	0.0	0.0	637.0
2001	364.2	185.2	35.0	32.0	16.6	0.0	0.0	633.0
2002	344.6	180.4	32.5	35.2	21.4	0.0	0.0	614.1
2003	359.4	182.9	31.2	39.0	35.5	0.2	0.0	648.2
2004	346.7	160.5	29.3	36.9	39.2	1.9	0.0	614.5
2005	270.1	113.5	23.1	33.5	43.0	5.8	0.0	489.0
2006	260.3	99.7	20.6	35.1	61.5	12.4	0.0	489.6
2007	307.0	139.4	22.2	40.0	70.3	15.5	0.1	594.5
2008	252.7	118.6	15.9	32.7	60.1	16.5	0.1	496.6
2009	263.9	108.3	19.9	39.2	65.3	25.0	0.1	521.7

Source: USDOI, BOEMRE, 2010b.

Table B-4

Description of the Scenario for a Catastrophic Spill Event Occurring in Shallow Water or Deep Water
(assumptions are described in detail in the text)

Scenario	Shallow-Water Location	Deepwater Location
Phase 1. Initial Event		
Vertical Location of Blowout	4 possible locations including sea surface, along the riser, at the seafloor, and below the seafloor	4 possible locations including sea surface, along the riser, at the seafloor, and below the seafloor
Duration of Uncontrolled Fire	1-30 days	1-30 days
Phase 2. Offshore Spill		
Duration of Spill	2-5 months	4-6 months
Rate of Spill	30,000 bbl per day	30,000-60,000 bbl per day
Total Volume of Spill (1)	0.9-3.0 MMbbl crude oil	2.7-7.2 MMbbl crude oil 10,000-20,000 bbl diesel fuel
API° Gravity	Fresh oil will float (API° >10)	Fresh oil will float (API° >10)
Characteristics of Oil Released	Typical South Louisiana midrange paraffinic sweet crude oil	Typical South Louisiana midrange paraffinic sweet crude oil; crude properties changed after oil traveled up the wellbore and passed through the water column, undergoing rapid depressurization and turbulence. Oil reached the surface as an emulsion stripped of many of its volatile components.
Response		
Number of Vessels	Up to 3,000	Up to 7,000
Number of Workers	Up to 25,000	Up to 50,000
Number of Planes/Helicopters	25/50	50/100
Boom (million feet)	5	13.5
Dispersant Application (surface application) (2)	35,000 bbl	33,000-bbl surface application and 16,500-bbl subsea application
Number of Miles of Shoreline Requiring Some Measure of Mechanical or Manual Cleaning	778	778
In-situ Burn	Yes, will occur	Yes, will occur
Vessel Decontamination Stations	Yes	Yes
Severe Weather	The potential for severe weather is noted, which could temporarily halt containment and response efforts.	The potential for severe weather is noted, which could temporarily halt containment and response efforts.
Fisheries Closure		During the peak, anticipate approximately 37% or 88,522 mi^2 (229,270 km^2) closed to recreational and commercial fishing.

Table B-4. Description of the Scenario for a Catastrophic Spill Event Occurring in Shallow Water or Deep Water (assumptions are described in detail in the text) (continued).

Scenario	Shallow-Water Location	Deepwater Location
Phase 3. Onshore Contact		
Shoreline Oiling Duration	1-5 months	3-6 months
Response		
Number of Staging areas	5-10	10-20
Number of Skimmers	200-300	500-600
Length of Shoreline Contacted		
	30 days[1] = 0-50 miles[2]	30 days[1] = 0-50 miles[2]
	60 days = 50-100 miles	60 days = 50-100 miles
	90 days = 100-1,000 miles	90 days = 100-1,000 miles
	120 days = >1,000 miles	120 days = >1,000 miles
	[1] Not cumulative. [2] Length was extrapolated	
Oil Characteristics and Appearance		—Essentially stable emulsions mixed with sand. —Typically initially stranded as surface layers and as discrete droplets/summer 2010.
Response Considerations for Sand Beaches	—No mechanical techniques allowed in some areas. —Much of the beach cleanup conducted at night. —Typically sand sieving, shaking, and sifting beach cleaning machines. —Repetitive tilling and mixing using agriculture plows and discs in combination with beach cleaning machines. —Sand washing treatment—sand sieve/shaker to remove debris and large oil particles and heated washing systems. —Nearshore submerged oil difficult to recover and hard to locate; vacuums and snares could be used.	—No mechanical techniques allowed in some areas. —Much of the beach cleanup conducted at night. —Typically sand sieving, shaking, and sifting beach cleaning machines. —Repetitive tilling and mixing using agriculture plows and discs in combination with beach cleaning machines. —Sand washing treatment—sand sieve/shaker to remove debris and large oil particles and heated washing systems. —Nearshore submerged oil difficult to recover and hard to locate; vacuums and snares could be used.
Response Considerations for Marshes	—Lightly oiled—allowed to recovery naturally; degrade in place or removed by tidal or wave action. —Moderately/heavily oiled—vacuumed or skimmed from boats possibly in conjunction with flushing; low-pressure flushing (with water comparable to marsh type); manual removal by hand or mechanized equipment; and vegetation cutting. —Heavily oiled areas—in-situ burning may be an	—Lightly oiled—allowed to recovery naturally; degrade in place or removed by tidal or wave action. —Moderately or heavily oiled—vacuumed or skimmed from boats possibly in conjunction with flushing; low-pressure flushing (with water comparable to marsh type); manual removal by hand or mechanized equipment; and vegetation cutting. —Heavily oiled areas—in-situ burning may be an option if water covers the sediment surface. —Bioremediation may be utilized but mostly as a

Table B-4. Description of the Scenario for a Catastrophic Spill Event Occurring in Shallow Water or Deep Water (assumptions are described in detail in the text) (continued).

	option if water covers the sediment surface. —Bioremediation may be utilized but mostly as a secondary treatment after bulk removal.	secondary treatment after bulk removal.
Response Considerations for Nearshore Waters	Marsh areas—skimming and vacuum (in areas too shallow to use skimmers) systems used in conjunction with flushing, and booming to temporarily contain mobile slicks.	Marsh areas—skimming and vacuum (in areas too shallow to use skimmers) systems used in conjunction with flushing, and booming to temporarily contain mobile slicks.
Phase 4. Recovery Phase		
Response		
Number of Vessels – 24-36 months post-spill/greater than 36 months	Fewer than 10/0 designated—called up only if new residual oil reported	Fewer than 10/0 designated—called up only if new residual oil reported
Number of Workers – 24-36 months post-spill/greater than 36 months	230/0 designated—called up only if new residual oil reported	230/0 designated—called up only if new residual oil reported
Miles of Shoreline Undergoing Regular Patrolling and Maintenance – 30-36 months post-spill/greater than 36 months	Fewer than 20/0	Fewer than 20/0
End Date for Dispersant Application	No dispersant usage 2 weeks after spillage ends	No dispersant usage 2 weeks after spillage ends
Remaining Sources of Unrecoverable Weathered Oil	Buried or in surface pockets in coastal sand, sediment, or muddy bottoms and in pockets on the seafloor.	Buried or in surface pockets in coastal sand, sediment, or muddy bottoms and in pockets on the seafloor.
Oil Characteristics and Appearance		As stranded oil weathered, some became buried through natural beach processes and appeared as surface residual balls (SRB) <10 cm (4 in) or as patties (SRP) 10 cm^{-1} m (4 in^{-3} ft).
Response Considerations for Sand Beaches, Marshes, and Nearshore Waters	See Phase 3 above.	See Phase 3 above.

(1) A blowout may contain crude oil, natural gas, and condensate. Because the majority of environmental damage is due to the release of oil, this text assumes the spill to be an oil spill. However, a natural gas release would result in a less visible and less persistent adverse impact than an oil release.
(2) Subsea dispersal application must be individually approved.

Source: British Petroleum, 2014b.

Table B-5

Birds Collected and Summarized by the U.S. Fish and Wildlife Service:
Post-*Deepwater Horizon* Explosion, Oil Spill, and Response in the Gulf of Mexico[1, 2]

Common Name	Species Group[3]	Grand Total	Visibly Oiled			Not Visibly Oiled			Unknown Oiling			Oiling Rate[4]
			Dead	Alive	Total	Dead	Alive	Total	Dead	Alive	Total	
Amer. Coot	Marsh/Wading	3	2	2	2	0	0	0	1	0	1	0.67
Amer. Oystercatcher	Shorebird	13	7	3	7	3	0	3	1	3	3	0.54
Amer. Redstart	Passerine	1	0	0	0	1	0	1	0	0	0	0.00
Amer. White Pelican	Seabird	19	5	3	8	4	0	4	4	8	7	0.42
Audubon's Shearwater	Seabird	36	1	1	1	35	0	35	0	2	0	0.03
Barn Owl	Raptor	1	0	0	0	1	0	1	0	0	0	0.00
Barn Swallow	Passerine	1	1	0	1	0	0	0	0	0	0	1.00
Belted Kingfisher	Passerine	1	0	0	0	1	0	1	0	1	0	0.00
Bl.-crown. Night Heron	Marsh/Wading	18	6	3	8	7	0	7	1	4	3	0.44
Black Skimmer	**Seabird**	**253**	**51**	**16**	**55**	**153**	**0**	**153**	**40**	**14**	**45**	**0.22**
Black Tern	Seabird	9	1	0	1	7	0	7	1	3	1	0.11
Bl.-bell. Whistl. Duck	Waterfowl	2	0	0	0	0	0	0	0	2	2	0.00
Black-necked Stilt	Shorebird	3	0	0	0	3	0	3	0	0	0	0.00
Blue-winged Teal	Waterfowl	6	0	0	0	6	0	6	0	0	0	0.00
Boat-tailed Grackle	Passerine	1	0	0	0	1	0	1	0	1	0	0.00
Broad-winged Hawk	Raptor	1	0	0	0	1	0	1	0	1	0	0.00
Brown Pelican	**Seabird**	**826**	**152**	**227**	**339**	**248**	**0**	**248**	**177**	**149**	**239**	**0.41**
Brown-headed Cowbird	Passerine	1	0	0	0	0	0	0	0	1	1	0.00
Bufflehead	Waterfowl	1	0	1	1	0	0	0	0	0	0	1.00
Canada Goose	Waterfowl	4	0	1	1	1	0	1	1	2	2	0.25
Caspian Tern	Seabird	17	7	3	8	4	0	4	2	6	5	0.47
Cattle Egret	Marsh/Wading	36	4	4	7	25	0	25	3	4	4	0.19
Clapper Rail	Marsh/Wading	120	27	5	29	64	0	64	20	14	27	0.24

Table B-5. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Response in the Gulf of Mexico[1, 2] (continued).

Common Name	Species Group[3]	Grand Total	Visibly Oiled			Not Visibly Oiled			Unknown Oiling			Oiling Rate[4]
			Dead	Alive	Total	Dead	Alive	Total	Dead	Alive	Total	
Common Loon	Diving	75	33	27	39	24	0	24	4	20	12	0.52
Common Moorhen	Marsh/Wading	4	1	0	1	3	0	3	0	0	0	0.25
Common Nighthawk	Passerine	1	0	0	0	0	0	0	0	1	1	0.00
Common Tern	Seabird	25	15	12	16	9	0	9	0	0	0	0.64
Common Yellowthroat	Passerine	2	0	0	0	2	0	2	0	0	0	0.00
Cooper's Hawk	Raptor	1	0	0	0	1	0	1	0	1	0	0.00
Cory's Shearwater	Seabird	4	0	0	0	3	0	3	0	1	1	0.00
Dbl-crest. Cormorant	Diving	23	2	1	2	17	0	17	2	7	4	0.09
Eastern Kingbird	Passerine	2	1	0	1	1	0	1	0	0	0	0.50
Eastern Meadowlark	Passerine	1	0	0	0	1	0	1	0	0	0	0.00
Eur. Collared-dove	Passerine	1	0	0	0	1	0	1	0	0	0	0.00
Eur. Starling	Passerine	2	0	1	1	1	0	1	0	0	0	0.50
Forster's Tern	Seabird	40	17	8	20	12	0	12	6	7	8	0.50
Fulvous Whistl. Duck	Waterfowl	1	0	0	0	0	0	0	0	1	1	0.00
Glossy Ibis	Marsh/Wading	2	1	1	1	1	0	1	0	0	0	0.50
Great Blue Heron	Marsh/Wading	42	5	3	6	26	0	26	4	16	10	0.14
Great Cormorant	Diving	1	0	0	0	1	0	1	0	0	0	0.00
Great Egret	Marsh/Wading	31	6	6	7	15	0	15	8	3	9	0.23
Great-horned Owl	Raptor	1	0	0	0	1	0	1	0	0	0	0.00
Greater Shearwater	Seabird	89	7	4	7	55	0	55	27	4	27	0.08
Green Heron	Marsh/Wading	16	2	0	2	8	0	8	1	6	6	0.13
Gull-billed Tern	Seabird	4	0	0	0	2	0	2	2	4	2	0.00
Herring Gull	Seabird	31	10	11	13	10	0	10	2	13	8	0.42
House Sparrow	Passerine	2	0	0	0	2	0	2	0	1	0	0.00
Killdeer	Shorebird	3	0	0	0	3	0	3	0	0	0	0.00

Table B-5. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Response in the Gulf of Mexico[1, 2] (continued).

Common Name	Species Group[3]	Grand Total	Visibly Oiled			Not Visibly Oiled			Unknown Oiling			Oiling Rate[4]
			Dead	Alive	Total	Dead	Alive	Total	Dead	Alive	Total	
King rail	Marsh/Wading	1	0	0	0	0	0	0	0	1	1	0.00
Laughing Gull	**Seabird**	**2,981**	**1,025**	**355**	**1,182**	**1,390**	**0**	**1,390**	**304**	**371**	**409**	**0.40**
Leach's Storm-petrel	Seabird	1	1	0	1	0	0	0	0	1	0	1.00
Least Bittern	Marsh/Wading	4	0	0	0	4	0	4	0	2	0	0.00
Least Tern	Seabird	106	46	7	49	43	0	43	12	3	14	0.46
Less. Bl.-backed Gull	Seabird	4	1	1	1	1	0	1	1	2	2	0.25
Less. Scaup	Waterfowl	1	0	0	0	0	0	0	1	0	1	0.00
Little Blue Heron	Marsh/Wading	5	0	0	0	4	0	4	1	1	1	0.00
Long-bill. Dowitcher	Shorebird	1	0	0	0	0	0	0	0	1	1	0.00
Magnif. Frigatebird	Seabird	8	3	3	4	2	0	2	1	2	2	0.50
Mallard	Waterfowl	26	5	4	6	16	0	16	0	7	4	0.23
Manx Shearwater	Seabird	6	1	0	1	5	0	5	0	0	0	0.17
Masked Booby	Seabird	9	4	3	4	1	0	1	0	4	4	0.44
Mottled Duck	Waterfowl	6	0	0	0	5	0	5	1	1	1	0.00
Mourning Dove	Passerine	15	3	1	3	8	0	8	0	6	4	0.20
Muscovy Duck	Waterfowl	1	0	0	0	1	0	1	0	1	0	0.00
Neotropic Cormorant	Diving	5	0	0	0	2	0	2	3	0	3	0.00
Northern Cardinal	Passerine	3	0	0	0	3	0	3	0	0	0	0.00
Northern Gannet	**Seabird**	**475**	**225**	**189**	**297**	**99**	**0**	**99**	**30**	**107**	**79**	**0.63**
Northern Mockingbird	Passerine	5	0	0	0	4	0	4	0	2	1	0.00
Osprey	Raptor	11	2	1	3	6	0	6	0	3	2	0.27
Pied-billed Grebe	Diving	32	18	24	24	7	0	7	1	3	1	0.75
Piping Plover	Shorebird	1	0	0	0	1	0	1	0	0	0	0.00
Purple Gallinule	Marsh/Wading	2	0	0	0	2	0	2	0	0	0	0.00
Purple Martin	Passerine	5	1	0	1	3	0	3	0	1	1	0.20

Table B-5. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Response in the Gulf of Mexico[1, 2] (continued).

Common Name	Species Group[3]	Grand Total	Visibly Oiled			Not Visibly Oiled			Unknown Oiling			Oiling Rate[4]
			Dead	Alive	Total	Dead	Alive	Total	Dead	Alive	Total	
Red-breasted Merg.	Waterfowl	2	1	1	1	1	0	1	0	1	0	0.50
Reddish Egret	Marsh/Wading	2	1	1	1	1	0	1	0	1	0	0.50
Red-shouldered Hawk	Raptor	1	0	0	0	0	0	0	0	1	1	0.00
Red-tailed Hawk	Raptor	1	0	0	0	1	0	1	0	0	0	0.00
Red-winged Blackbird	Passerine	1	0	0	0	1	0	1	0	0	0	0.00
Ring-billed Gull	Seabird	2	0	1	1	1	0	1	0	0	0	0.50
Rock Dove (pigeon)	Passerine	16	2	2	3	4	0	4	2	10	9	0.19
Roseate Spoonbill	Marsh/Wading	15	7	3	7	3	0	3	5	1	5	0.47
Royal Tern	**Seabird**	**289**	**116**	**66**	**149**	**104**	**0**	**104**	**19**	**47**	**36**	**0.52**
Ruddy Duck	Waterfowl	1	1	0	1	0	0	0	0	0	0	1.00
Ruddy Turnstone	Shorebird	13	1	3	3	8	0	8	1	5	2	0.23
Sanderling	Shorebird	26	4	2	4	20	0	20	1	6	2	0.15
Sandwich Tern	Seabird	70	28	20	34	25	0	25	8	14	11	0.49
Seaside Sparrow	Passerine	9	4	0	4	5	0	5	0	0	0	0.44
Semipalm. Sandpiper	Shorebird	3	2	1	3	0	0	0	0	0	0	1.00
Short-bill. Dowitcher	Shorebird	1	0	0	0	1	0	1	0	0	0	0.00
Snowy Egret	Marsh/Wading	22	12	9	14	6	0	6	2	3	2	0.64
Sooty Shearwater	Seabird	1	0	0	0	0	0	0	0	1	1	0.00
Sooty Tern	Seabird	3	0	1	1	2	0	2	0	1	0	0.33
Sora	Marsh/Wading	5	2	1	2	1	0	1	2	0	2	0.40
Spotted Sandpiper	Shorebird	1	0	0	0	1	0	1	0	0	0	0.00
Surf Scoter	Waterfowl	1	1	1	1	0	0	0	0	0	0	1.00
Tri-colored Heron	Marsh/Wading	31	9	5	11	7	0	7	11	2	13	0.35
Virginia Rail	Marsh/Wading	3	0	0	0	3	0	3	0	1	0	0.00
White Ibis	Marsh/Wading	7	1	1	1	4	0	4	2	3	2	0.14

Table B-5. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Response in the Gulf of Mexico[1, 2] (continued).

Common Name	Species Group[3]	Grand Total	Visibly Oiled			Not Visibly Oiled			Unknown Oiling			Oiling Rate[4]
			Dead	Alive	Total	Dead	Alive	Total	Dead	Alive	Total	
White-tail. Tropicbird	Seabird	1	0	0	0	1	0	1	0	0	0	0.00
White-wing. Dove	Passerine	1	0	0	0	1	0	1	0	0	0	0.00
Willet	Shorebird	13	2	1	3	8	0	8	1	3	2	0.23
Wilson's Plover	Shorebird	3	0	0	0	2	0	2	1	0	1	0.00
Yellow-billed Cuckoo	Passerine	2	2	0	2	0	0	0	0	0	0	1.00
Yel.-cr. Night Heron	Marsh/Wading	9	1	0	1	7	0	7	0	3	1	0.11
Unid. Blackbird	Passerine	1	0	0	0	0	0	0	0	1	1	0.00
Unid. Booby	Seabird	1	0	0	0	1	0	1	0	1	0	0.00
Unid. Cormorant	Diving	14	3	0	3	10	0	10	1	0	1	0.21
Unid. Dowitcher	Shorebird	2	1	0	1	1	0	1	0	1	0	0.50
Unid. Duck	Waterfowl	2	0	0	0	1	0	1	1	0	1	0.00
Unid. Egret	Marsh/Wading	15	2	0	2	11	0	11	2	1	2	0.13
Unid. Flycatcher	Passerine	1	1	0	1	0	0	0	0	0	0	1.00
Unid. Grebe	Diving	4	2	1	2	2	0	2	0	0	0	0.50
Unid. Gull	Seabird	248	79	1	80	134	0	134	33	4	34	0.32
Unid. Hawk	Raptor	2	0	0	0	2	0	2	0	0	0	0.00
Unid. Heron	Marsh/Wading	15	5	0	5	8	0	8	1	1	2	0.33
Unid. Loon	Diving	7	2	2	4	3	0	3	0	1	0	0.57
Unid. Mockingbird	Passerine	1	0	0	0	1	0	1	0	0	0	0.00
Unid. Owl	Raptor	1	0	0	0	1	0	1	0	0	0	0.00
Unid. Passerine	Passerine	1	0	0	0	1	0	1	0	0	0	0.00
Unid. Pelican	Seabird	25	5	1	5	15	0	15	4	1	5	0.20
Unid. Pigeon	Passerine	14	2	1	3	6	0	6	1	6	5	0.21
Unid. Rail	Marsh/Wading	4	1	0	1	3	0	3	0	0	0	0.25
Unid. Raptor	Raptor	1	0	0	0	1	0	1	0	0	0	0.00

Table B-5. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Response in the Gulf of Mexico[1, 2] (continued).

Common Name	Species Group[3]	Grand Total	Visibly Oiled			Not Visibly Oiled			Unknown Oiling			Oiling Rate[4]
			Dead	Alive	Total	Dead	Alive	Total	Dead	Alive	Total	
Unid. Sandpiper	Shorebird	2	0	0	0	2	0	2	0	2	0	0.00
Unid. Shearwater	Seabird	6	0	0	0	5	0	5	1	0	1	0.00
Unid. Shorebird	Shorebird	3	2	0	2	0	0	0	1	0	1	0.67
Unid. Skimmer	Seabird	6	0	0	0	5	0	5	1	0	1	0.00
Unid. Sparrow	Passerine	3	0	0	0	1	0	1	2	0	2	0.00
Unid. Swallow	Passerine	1	0	0	0	1	0	1	0	0	0	0.00
Unid. Tern	Seabird	132	38	1	39	79	0	79	13	2	14	0.30
Unid. Warbler	Passerine	1	0	0	0	1	0	1	0	0	0	0.00
Unknown spp.		593	51	2	53	451	0	451	88	1	89	0.09
Other		106	31	3	34	52	0	52	7	14	20	0.32
Column Totals		7,258	2,121		2,642	3,387		3,387	873		1,229	0.24

[1] Data obtained from the U.S. Fish and Wildlife Service (FWS) as part of the *Deepwater Horizon* post-spill monitoring and collection process are summarized for May 12, 2011 (USDOI, FWS, 2011a). The data used in this table are verified as per FWS's QA/QC processes. Disclaimer: All data should be considered provisional, incomplete, and subject to change (USDOI, FWS, 2011a). For more information, refer to the Weekly Bird Impact Data and Consolidated Wildlife Reports. Numbers in this table have been verified against the original data from FWS's website (USDOI, FWS, 2011a).

[2] As of May 12, 2011, 104 avian species had been collected and identified through the *Deepwater Horizon* post-spill monitoring and collection process (USDOI, FWS, 2011a). Note: Though the process was triggered by the *Deepwater Horizon* explosion and oil spill, not all birds recovered were oiled (36% = oiled, 47% = unoiled, 17% = unknown), suggesting that "search effort" alone accounted for a large proportion of the total (n = 7,258) birds collected (Piatt et al., 1990a, page 127). Some of the live birds collected may have been incapable of flight due to age or molt, and some of the dead birds collected may have died due to natural mortality, predation, or other anthropogenic sources of mortality. The overall oiling rate across species including "others" and "unknowns" was 0.24 versus 0.25 for individuals identified to species. The oiling rate for the **Top 5** (see bold rows in table) most-impacted avian species was 0.43 and included representatives only from the seabird group. These are listed in descending order based on the number collected: laughing gull (2,981 collected, 0.40 oiling rate); brown pelican (826 collected, 0.41 oiling rate); northern gannet (475 collected, 0.63 oiling rate); royal tern (289 collected, 0.52 oiling rate); and black skimmer (253 collected, 0.22 oiling rate). Note: There is a difference between the table structure here compared with the original table on FWS's website. Herein, columns for live birds that later died were not included. Totals associated with each larger grouping are correct and sum to those column totals for the May 12, 2011, Collection Report values. Six new species or rows were added and 3 species were removed between the December 14, 2010, Collection Report (USDOI, FWS, 2010d) and the May 12, 2011, Collection Report (USDOI, FWS, 2011a). The major difference in number (-807) between the more recent and older versions was due to an ~10% overestimate in the previous report representing live birds that later died, as these individuals were counted twice in the December 14, 2010, Collection Report (USDOI, FWS, 2010d).

[3] For additional information on oiling rates by Species Group and additional statistics, refer to Table 4-12 of the 2012-2017 WPA/CPA Multisale EIS.

Table B-5. Birds Collected and Summarized by the U.S. Fish and Wildlife Service Post-*Deepwater Horizon* Explosion, Oil Spill, and Response in the Gulf of Mexico[1, 2] (continued).

[4] Oiling Rate: For each species, an oiling rate was calculated by dividing the "total" number of oiled individuals (∑ alive + dead) /∑ of total individuals collected for a given species/row. In general, it has been well documented that the number of birds collected after a spill event represents a small fraction of the total oiled population (direct mortality) due to various factors: species-specific differences in vulnerability to spilled oil, species-specific differences in distribution, habitat use and behavior; species-specific differences in abundance; species-specific differences in carcass deposition rates, persistence rates, and detection probabilities; overall search effort and temporal and spatial variation in search effort; and carcass loss due to predation, habitat, weather, tides, and currents (Piatt et al., 1990a and 1990b; Ford et al., 1996; Piatt and Ford, 1996; Fowler and Flint, 1997; Flint and Fowler, 1998; Flint et al., 1999; Hampton and Zafonte, 2005; Ford, 2006; Castège et al., 2007; Ford and Zafonte, 2009; Byrd et al., 2009; Flint et al., 2010). For example, Piatt and Ford (1996, Table 1) estimated a mean carcass recovery rate of only 17% for a number of previous oil-bird impact studies. Burger (1993) and Wiese and Jones (2001) estimated recovery rates of 20% with the latter study based on a drift-block design to estimate carcass recovery rate from beached-bird surveys. Due to the fact that the coastline directly inshore of the well blowout location is primarily marsh and not sandy beaches, due to the distance from the blowout location to the coast, and due to predominant currents and wind directions during the event, the number of birds collected will likely represent a recovery estimate in the lower ranges of those provided in the literature to date (≤10%). A range of mortality estimates given the total number of dead birds collected through May 12, 2011, of 7,258 birds x recovery rates from the literature (0-59% in Piatt and Ford, 1996, Table 1) suggests a lower range of 12,302 birds* (59% recovery rate), an upper range of 725,800 birds* (0% recovery rate), and 42,694 birds based on the 17% mean recovery rate from Piatt and Ford (1996). The lower range of estimates (i.e., high carcass recovery rates) is likely biased low because it assumes no search effort after May 2011 (i.e., no more birds were collected after that date) and does not account for any of the detection probability parameters that are currently unknown. The actual avian mortality estimate will likely not be available until the NRDA process has been completed; this should include a combination of carcass drift experiments, drift-block experiments, corrections for carcass deposition and persistence rates, scavenger rates, and detection probability with additional modeling to more precisely derive an estimate. For additional information on oiling rates by Species Group and additional statistics, refer to Table 4-12 of the 2012-2017 WPA/CPA Multisale EIS. Note: Spill volume tends to be a poor predictor of bird mortality associated with an oil spill (Burger, 1993), though it should be considered for inclusion in any models to estimate total bird mortality, preferably with some metric of species composition and abundance (preferably density) pre-spill (Wilhelm et al., 2007).

* Corrected values are based on revisiting the original calculations after publication of the 2012-2017 WPA/CPA Multisale EIS. An additional estimate for total mortality based on Piatt and Ford (1996) is also provided.

Table B-6

Federally Listed Avian Species Considered by State and Associated Planning Area in the Gulf of Mexico[1]

Species	Status	Critical Habitat	IUCN Red List Status[2]	States	Planning Area
Red-cockaded Woodpecker	Endangered	No rules published	Vulnerable	AL, FL, LA, MS, TX	WPA, CPA, EPA
Least Tern[3]	Endangered	No rules published	Least Concern	AL, LA, TX (FL, MS)	WPA, CPA, EPA
Piping Plover	Threatened	Designated	Near Threatened	AL, FL, LA, MS, TX	WPA, CPA, EPA
Roseate Tern	Threatened	No rules published	Least Concern	FL only	EPA
Wood Stork	Endangered	No rules published	Least Concern	AL, FL, MS	CPA, EPA
Whooping Crane	Endangered	Designated	Endangered	TX, LA[4], FL[4]	WPA, CPA, EPA
Mississippi Sandhill Crane	Endangered	Designated	Not Yet Assessed	MS only	CPA
Attwater's Prairie Chicken	Endangered	No rules published	Not Yet Assessed	TX only	WPA
N. Aplomado Falcon	Endangered	No rules published	Not Yet Assessed	TX only	WPA
Everglades Snail Kite	Endangered	Designated	Not Yet Assessed	FL only	EPA
Cape Sable Seaside Sparrow	Endangered	Designated	Not Yet Assessed	FL only	EPA
Audubon's Crested Caracara	Threatened	No rules published	Not Yet Assessed	FL only	EPA
Sprague's Pipit	Candidate	NA – Priority 2	Vulnerable	LA, TX	WPA, CPA
Bald Eagle	Delisted	No rules published	Least Concern	AL, FL, LA, MS, TX	WPA, CPA, EPA
Peregrine Falcon	Delisted	Designated	Least Concern	AL, FL, LA, MS, TX	WPA, CPA, EPA
Eastern Brown Pelican	Delisted	No rules published	Least Concern	AL, FL, LA, MS, TX	WPA, CPA, EPA
Red Knot	Proposed Threatened	NA – proposed threatened	Least Concern	FL, LA, TX	WPA, CPA, EPA

[1] Information contained in this table was obtained via an email attachment from the U.S. Fish and Wildlife Service (FWS) on April 6, 2012 (USDOI, FWS, 2012) and from FWS's "Endangered Species" website and associated queries for "species" available from FWS's website (USDOI, FWS, 2011b). Additional information for each species can be found at NatureServe Explorer (2011). Note: All species listed in this table are considered, but only the piping plover, roseate tern, whooping crane, wood stork, Mississippi sandhill crane, bald eagle, eastern brown pelican, and red knot will be analyzed.

[2] International Union for Conservation of Nature (IUCN) – The Red List classifies species as imperiled (Critically Endangered, Endangered, or Vulnerable), not imperiled (Near Threatened or Least Concern), extinct (Extinct, Extinct in the Wild), or Data Deficient (Butchart et al., 2004 and 2005; Harris et al., 2012). If species meet the quantitative thresholds of any of the following criteria, they will be added to the Red List: (1) decline in population size; (2) small geographic range; (3) small population size plus decline; (4) very small population size; or (5) quantitative analysis.

[3] The Interior population of the least tern was listed as endangered on May 28, 1985 (*Federal Register*, 1985) throughout much of its breeding range in the Midwest. This designation does not provide or extend Endangered Species Act (ESA) protection to the breeding population of Gulf Coast "population" of least terns. Similarly, ESA protection for breeding least terns only applies to certain segments or areas (inland rivers and lakes ~50 mi [80 km] inland) of Louisiana, Mississippi, and Texas.

[4] The whooping crane is considered endangered throughout its range in the U.S. except where nonessential, experimental flocks have been established. More recently, a release site (White Lake Wetlands Conservation Area, Vermilion Parish) was added in Louisiana (Table 4-14 of the 2012-2017 WPA/CPA Multisale EIS) with a release of 10 birds on February 22, 2011. To date, only 3 of the original 10 released cranes remain; an additional release of 16 cranes occurred on December 1, 2011. The Gulf Coast States that have these nonessential, experimental flocks include Alabama, Louisiana, Mississippi, and Florida; as well, wild whooping cranes may rarely occur as transients in Mississippi and Alabama, but they are not known to breed in either state.

[5] The red knot is currently a proposed threatened species as of September 30, 2013 (*Federal Register,* 2013).

KEYWORD INDEX

KEYWORD INDEX

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The Department of the Interior Mission

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

The Bureau of Ocean Energy Management Mission

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